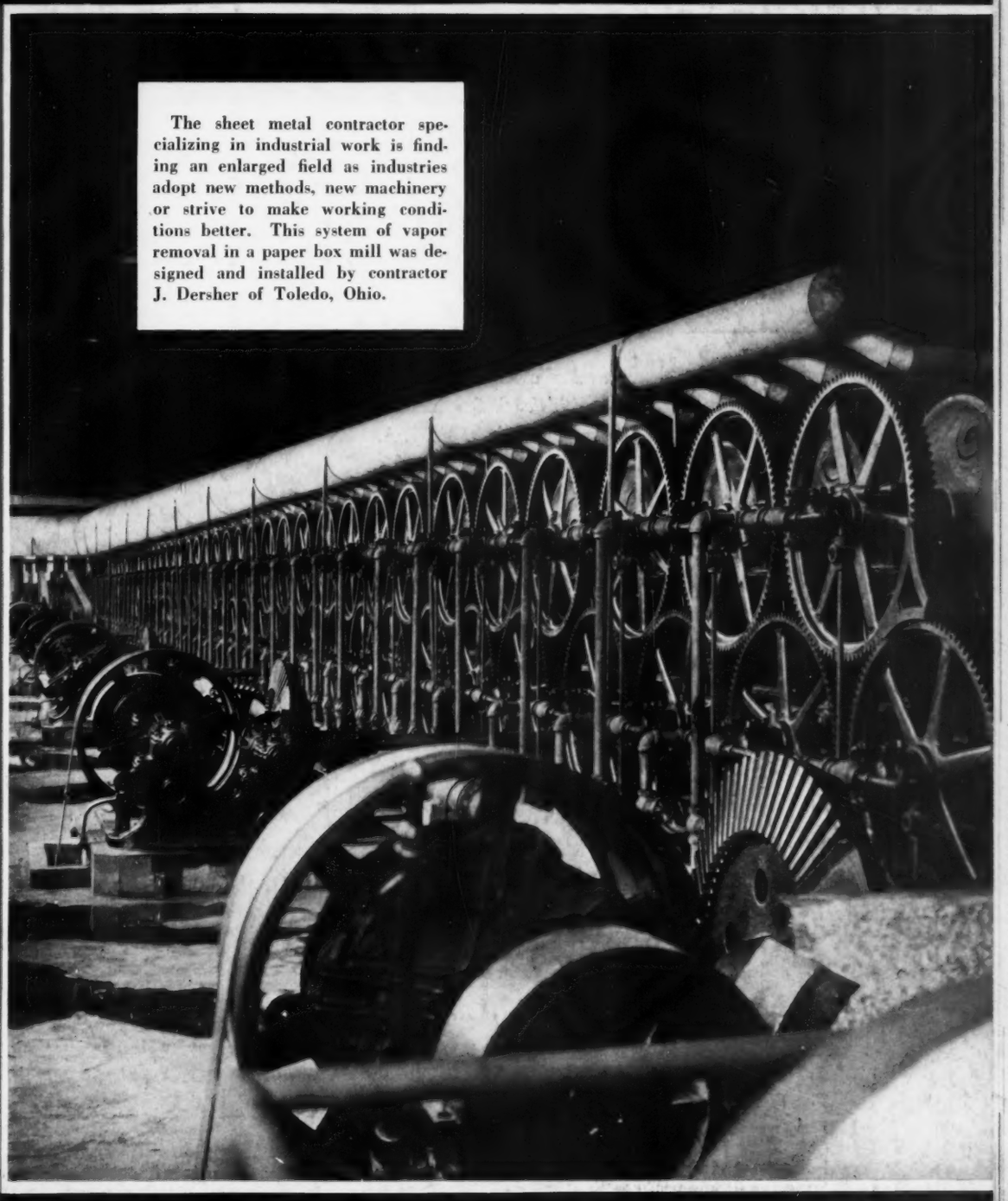
# AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING



The sheet metal contractor specializing in industrial work is finding an enlarged field as industries adopt new methods, new machinery or strive to make working conditions better. This system of vapor removal in a paper box mill was designed and installed by contractor J. Dersher of Toledo, Ohio.

ABLISHED
8 8 0

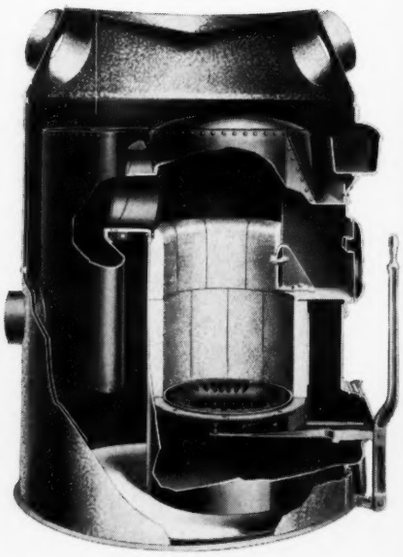
JUNE
1937

THE AIR CONDITIONING SECTION

# NO PAYMENTS *until Sept. 30th*

# SUNBEAM

## SUMMER FINANCING PLAN



SUNBEAM Steel Furnace, Series No. 500, the quality furnace at a competitive price—one of the 4 series of furnaces and 8 series of air conditioners in the complete Sunbeam Line. Models for coal, oil and gas.

HERE'S the greatest sales-boosting plan ever offered the heating trade . . . *and it's exclusive with SUNBEAM Dealers.* This new finance plan replaces F. H. A. Financing (Title 1, Modernizing) that expired March 31. It keeps you busy during the "slow" summer months. It advances money for your prospects to buy SUNBEAM Furnaces and Air Conditioning Units . . . *at no risk to you.* Read carefully the list of advantages to you and your customers.

There's no limit to the replacement market . . . millions of homes need new heating plants . . . an overripe market just waiting to be picked. This SUNBEAM Finance Plan is bound to bring a large part of the local business to your store NOW, *BECAUSE* first payments can be deferred until September 30th *at no extra cost.* There's no reason for the prospect to wait.

The sale of heating equipment becomes a year round business. Jobs you formerly couldn't handle in the fall rush can be put in NOW—*in your slack summer season.* It is going to mean more sales, more profits, and an end to collection worries. Better rush the coupon today.

### ADVANTAGES TO THE SUNBEAM DEALER

1. Profitable replacement jobs can be sold as easily in Spring and Summer, as in the Fall.
2. No hold-back; dealer receives **all** his money when installation is completed.
3. No financial statement required.
4. Dealer endorses notes **without** recourse.
5. Free credit investigations.
6. No charge for collections.
7. No legal expenses.
8. It is not necessary to refer transactions to Sunbeam Headquarters. They are passed on in most principal cities.

### ADVANTAGES TO THE HOME OWNER

1. The first monthly payment is deferred until September 30th.
2. No down payment required.
3. As long as 3 years to pay.
4. Monthly payments as low as $10.00.
5. One simple form to fill out.
6. Simple credit requirements.
7. Reasonable financing fees. No increase for deferring first payment.

**THE FOX FURNACE COMPANY, ELYRIA, OHIO**

**Division of American Radiator and Standard Sanitary Corporation**

The Fox Furnace Co., Elyria, Ohio.

Please send me information on the SUMMER Financing Plan that will bring us profitable sales during the Spring and Summer months.

NAME_____

ADDRESS_____

CITY_____ STATE_____ AA-6-37

# AUBURN AUTOMOBILE COMPANY
## (CORD CORPORATION) Going into Domestic Air Conditioning Business in a Big Way

**Russell Electric Company has granted Auburn an exclusive patent license on Noiseless Planoidal Blowers, Ballentine Variable-Speed Capacitor Motors, Ozone and Ion Generating Apparatus for use in a central air conditioning system. Auburn will build attractive new drawn metal cabinets, assemble the units, and have complete charge of the advertising, marketing and sales distribution. First shipment of the new units will start about July 1.**

# RUSSELL ELECTRIC COMPANY
## To Discontinue Manufacture and Sale of Air Conditioning Units on July 14, 1937

**All orders for units like B1F, B1FW or similar units must be received not later than one week from publication of this magazine for shipment not later than July 14. No further orders or shipments can be accepted or made after above dates, but service parts will be available indefinitely for all units in the field.**

**Avoid disappointments by immediately informing every prospect you have quoted so that they may have the opportunity of placing an immediate order.**

# RUSSELL ELECTRIC COMPANY will
## Continue Manufacture and Sale of Controls and Giant Nite Fans Through their Regular Trade Channels the same as in the Past

**The production problems of running our factory on three 8-hour shifts are taking all the attention of our Engineering and Executive Staff at this time. Later in the year, we will complete our well-advanced development work on NEW CONTROL LINES and will offer the finest quality line of stoker and oil burner controls with thermostats, limit switches, etc., that the market affords.**

**The demand for domestic air conditioning equipment with the exclusive features found in our patented developments is running into volumes that are far in excess of our production facilities. We feel that the public interest will be best served by our sticking to our specialized line of development and parts manufacture and by having the cabinet manufacture, the assembly, and the marketing handled by an organization like Auburn with tremendous capital and plant facilities that are commensurate with the enormous expansion with which we are now faced in this field.**

**INQUIRIES** regarding these new air conditioning units should be addressed to:

*Central Manufacturing Division*

*of* **AUBURN AUTOMOBILE CO.**
Bankers Building
105 W. ADAMS ST.
CHICAGO, ILLINOIS

**RUSSELL ELECTRIC COMPANY**
342 WEST HURON STREET CHICAGO, ILLINOIS

## *In This Issue*

Contractors who bemoan the loss of architectural sheet metal work because of new style architecture will be interested in the article on page 20 describing the installation of some $5,000 worth of flashing on a building which might, by ordinary standards, use $400 worth of metal.

★

For months we have been reporting the progress and troubles of the warm air heating licensing ordinance in Ft. Wayne, Ind. Now the ordinance has been passed and possesses, we believe, some provisions well worth study. The committee responsible for final passage points out these unusually good features on page 23.

★

In order to bring to readers' attention the actual situation in labor supply and wages we made a survey through active associations, asking about mechanic shortages, wage rates (union and open shop), what is being done about apprentices, and so forth. The survey is published on page 28.

★

The work of contractors who specialize in certain fields of work is always interesting. In Kalamazoo, Michigan, the Temple company has spent years working with paper manufacturers. Some of the interesting things this firm does are related on page 30.

★

Contractors doing their first cooling jobs are always anxious to know whether or not they overlooked important factors in figuring the cooling load. Professor H. J. Macintire, on page 47, makes the steps to calculation sound really simple.

★

And for those merchandisers who want to know the latest thinking on selling we publish another Towne article on page 48. This one deals with closing, "closers," how to keep from shivering when producing the order book; gives some sample closing conversations.

★

There is going to be, we believe, a great deal of interest this summer in cooling with well water. There are certain approved steps to follow in laying out and calculating a well water cooling system. The best information on the subject appears in a booklet which we are reprinting on page 50.

★

S. Konzo also takes a hand in our cooling campaign and writes the first of three articles on night air cooling. We thought we knew all about night air cooling until we began to read the manuscript and began to picture the facts Mr. Konzo is leading up to. This series will bring some heretofore unpublished or seldom known facts about night air cooling.

★

And to round out the cooling picture we publish on page 54 the complete plans and specifications of one of 1936's most interesting water cooling systems with a well, pump, coils, roof pond, special grilles and so forth.


# AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning



J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor — Brewster S. Beach, Consulting Editor



Vol. 106, No. 6 — June, 1937 — Founded 1800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***More than 8,000 Copies of this Issue are being distributed***

# HOW TO GET *More Business* WITH U·S·S STAINLESS STEEL

IT'S easy to get extra, profitable jobs with USS Stainless Steel.

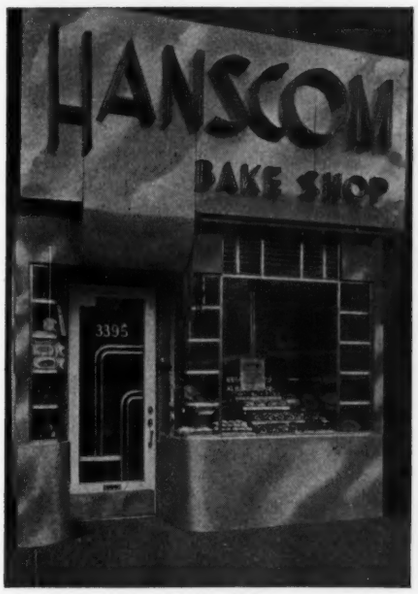
Today, everybody knows stainless steel. They like its brilliant modern appearance. They know that it lasts longer, stays cleaner, does a better finer job. There is a great public preference for this prince of steels.

Here are the three facts which make USS Stainless Steel so saleable: (1) It is immune to atmospheric corrosion, to all food corrosion, and to many corrosive chemical agents. This means that equipment of USS Stainless Steel cleans like glass, needs neither polish nor paint nor lacquer, never contaminates anything. (2) It is one of the strongest, toughest of all metals. There is no known limit to its useful life. It resists wear, abrasion, scratching. (3) It is easily finished in any desired luster from high polish to glowing satin.

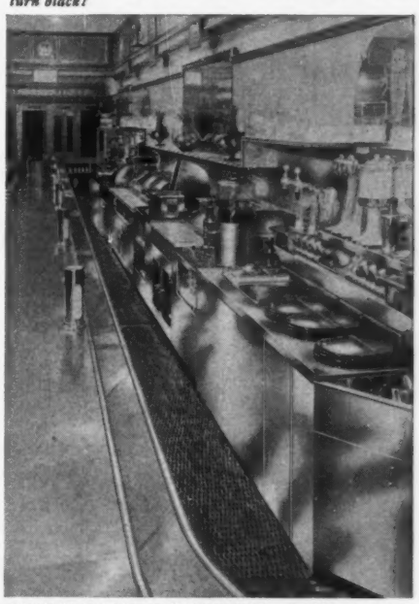
To close the sale, just remind your customer that in addition to giving him a better, more attractive job — USS Stainless Steel will cost less, far less, per year of use.

Go after jobs in stainless steel — kitchens, restaurants, bars, fountains, store fronts, architectural trim, factory equipment. Set yourself up as the stainless steel specialist in your locality. Make no mistake . . . there will be a lot more business in stainless steel.

EVEN UNPRETENTIOUS *homes are excellent prospects for drainboards, sideboards and sinks of USS Stainless Steel. Women like them because they never tarnish and are so easy to clean. Stainless Steel is the only metal which is immune to all food corrosion, will never turn black!*




SEE HOW *this smart New York bakery is making a lot out of a small location with an inviting easy-to-fabricate front of USS Stainless Steel. Do you know any bakeries in your locality who could use a front like this? Just show them this photograph!*



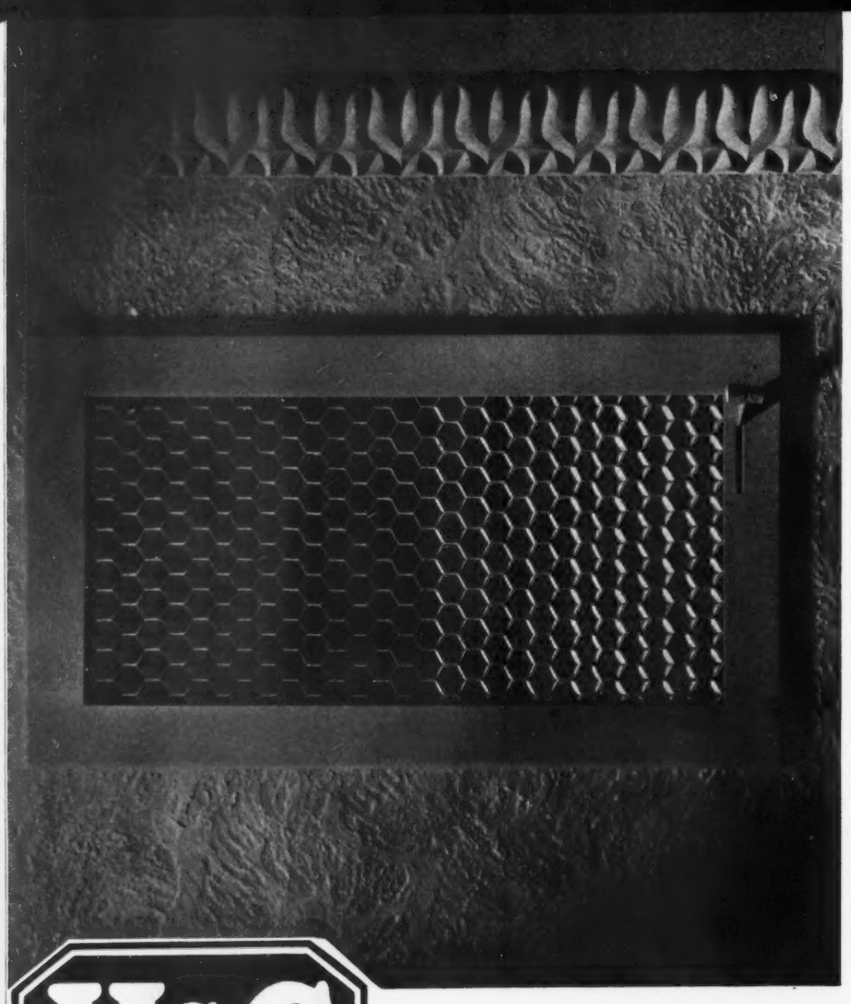
RESTAURANT EQUIPMENT *of USS Stainless Steel is easy to make. Easy to sell, too, because it helps the restaurant make more money. People everywhere identify "stainless" with "cleanliness" . . . and cleanliness attracts customers, whets their appetites.*

## U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, *Chicago and New York*
CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*
NATIONAL TUBE COMPANY, *Pittsburgh*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL



# H&C No. 90 DESIGN

## The Ace of Air Conditioning Grilles

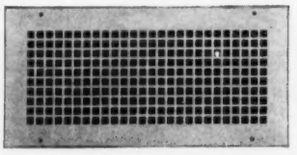
**Its curved tubular openings, 1 inch in depth, make possible these outstanding advantages:**

(a) Exceptional concealment of duct.
(b) Accurate control of air flow in both a horizontal and vertical plane.
(c) Elimination of streaked ceilings.
(d) Remarkably low resistance.
(e) Freedom from noise producing turbulence.

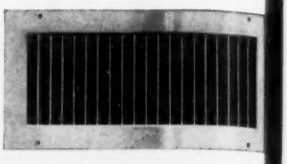
**Inspect the No. 90 and the rest of the very comprehensive H&C Air Conditioning line at your jobber's. All designs available in choice of six installation frames. Ask your jobber for a copy of the H&C Air Conditioning Catalog, No. 37AC, or write direct. It contains much helpful data.**

*Streakproof Rubber Gasket now furnished as standard on all 3-piece sidewall registers at no extra charge.*

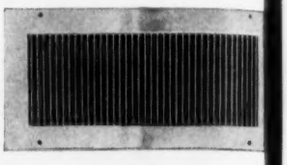
## Other H&C Designs



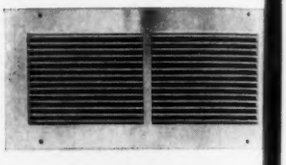
**NO. 71 DESIGN**
A low-priced attractive grille. Small openings (3/8") afford excellent concealment of duct—improve appearance. Price Group A



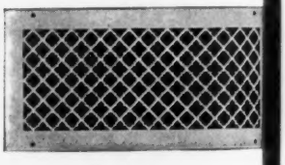
**NO. 72 DESIGN**
Combines bar type construction neat appearance, unusually large free area with low cost. Depth of bars is 3/8". Price Group



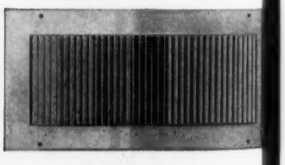
**NO. 77 DESIGN**
Made up of bars 3/8" in depth spaced 3/8" apart. Affords neat appearance, effective concealment of duct at very modest cost. Price Group B



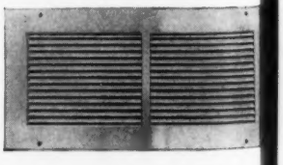
**NO. 78 DESIGN**
Similar construction to No. 77 except bars are horizontal. Center mullion further enhances appearance. Price Group B



**NO. 76 DESIGN**
Inexpensive — A favorite with many because of its attractive appearance which harmonizes with any interior. Price Group

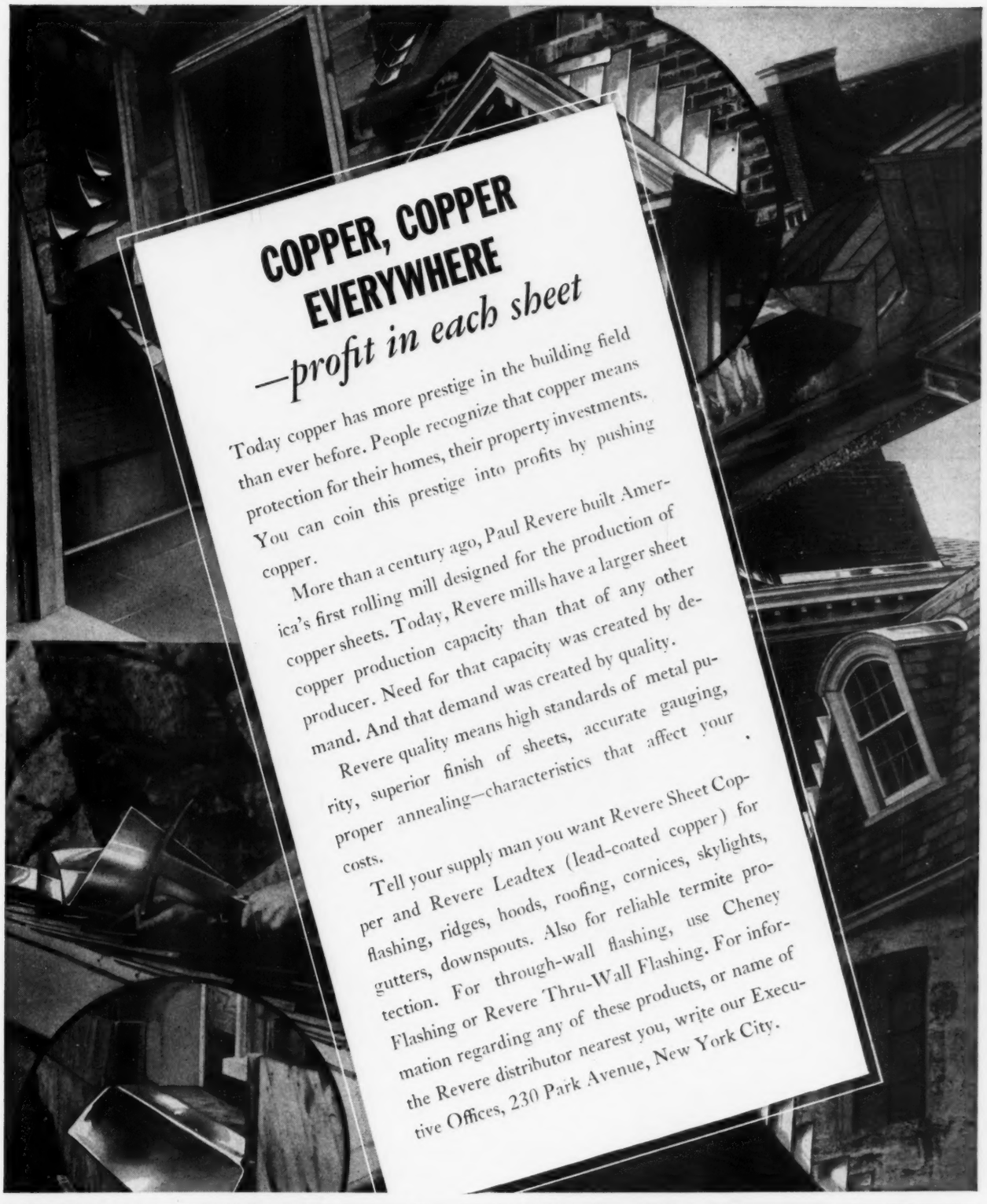


**NO. 84 DESIGN**
Adjustable bar type. Provides easily and quickly, any deflection or combination of deflections desired. Price Group D



**NO. 85 DESIGN**
Similar in construction to No. 8 Downward adjustment of the bars when located near the ceiling avoids streaked ceilings. Price Group D


**HART & COOLEY MANUFACTURING CO.**
Warm Air Registers
Damper Regulator Sets
H&C
Air Conditioning Grilles
Dampers, Chain, Pulleys
61 W. KINZIE STREET, CHICAGO, ILLINOIS
ENGINEERING OFFICE AND FACTORY · HOLLAND · MICH.


COPPER, COPPER EVERYWHERE
—profit in each sheet
Today copper has more prestige in the building field than ever before. People recognize that copper means protection for their homes, their property investments. You can coin this prestige into profits by pushing copper.
More than a century ago, Paul Revere built America's first rolling mill designed for the production of copper sheets. Today, Revere mills have a larger sheet copper production capacity than that of any other producer. Need for that capacity was created by demand. And that demand was created by quality. Revere quality means high standards of metal purity, superior finish of sheets, accurate gauging, proper annealing—characteristics that affect your costs.
Tell your supply man you want Revere Sheet Copper and Revere Leadtex (lead-coated copper) for flashing, ridges, hoods, roofing, cornices, skylights, gutters, downspouts. Also for reliable termite protection. For through-wall flashing, use Cheney Flashing or Revere Thru-Wall Flashing. For information regarding any of these products, or name of the Revere distributor nearest you, write our Executive Offices, 230 Park Avenue, New York City.

# Revere Copper *and* Brass

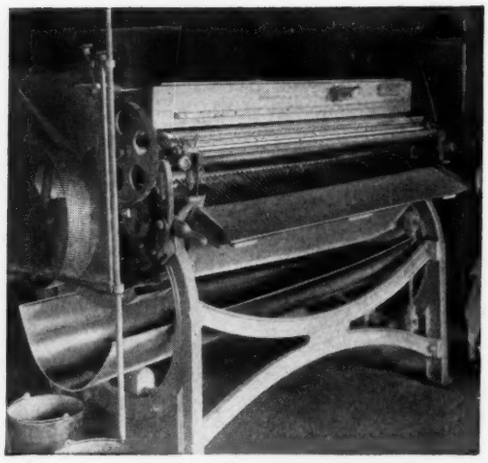
INCORPORATED

FOUNDED BY PAUL REVERE 1801

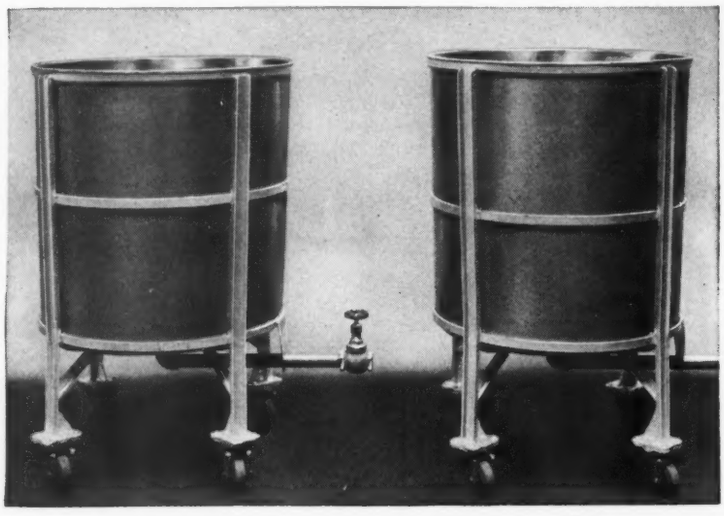
EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY • MILLS: BALTIMORE, MD. • TAUNTON, MASS. NEW BEDFORD, MASS. • ROME, N. Y. • DETROIT, MICH. • CHICAGO, ILL. • SALES OFFICES IN PRINCIPAL CITIES

# YOUR

**COSMETICS.** *These 75-gal. Monel containers with covers were supplied to a manufacturer of cosmetics for the storage of sensitive aromatic products. All manufacturers of quality toilet soaps, cosmetics, and perfumes are prospects for Monel containers, hoppers, troughs, kettles, utensils, etc.*



**LEATHER TANNERIES.** *Just a little job—Monel trough on a leather dyeing machine (note the Monel buckets, too)—but just the sort of thing which brings new business for larger Monel installations. There are many opportunities in leather tanneries for Monel equipment, such as tanning drum linings, liquor feed boxes, hoods, linings for plant trucks, covers and utensils.*



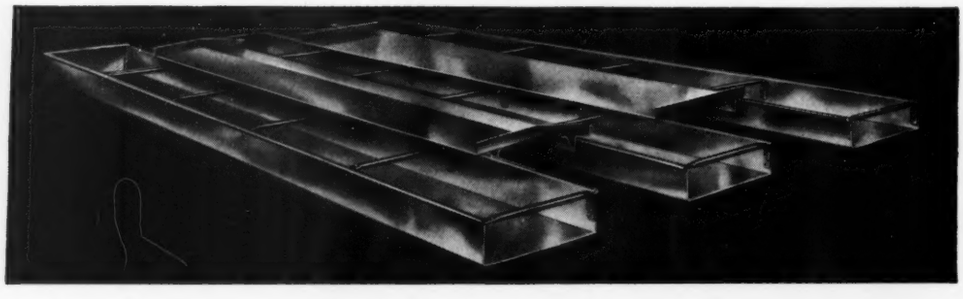
• • •

**PHARMACEUTICAL.** *(left) Two portable 60-gal. Monel kettles equipped with Monel outlet and valve for handling pharmaceutical products. Made from 18 ga. (.050) standard Monel sheet and welded throughout. Pharmaceutical plants everywhere recognize the advantages of Monel and are good prospects for additional Monel business.*

• • •

**CHEMICAL.** *(left) Simple to make from standard Monel sheet are these drying trays supplied to a chemical processing plant. 2" x 23" x 52" with all joints welded, the Monel trays will save money for the user as they will last indefinitely, at the same time protect the product against harmful discoloration and contamination.*

**PAPER MILLS.** *(below) Monel save-all trays for paper making machines. The highly resistant and smooth surface of Monel greatly reduces the tendency of stocks, slime and filler to accumulate and it facilitates cleaning. The high strength of Monel permits sturdy construction and often makes it possible to save weight without sacrificing durability. Monel is also used in paper mills for suction box linings and covers, washer and filter linings, tanks, containers, etc.*



# NEIGHBORS...

## *have they heard the news about* YOU?

**RAYON.** *A well-known rayon manufacturer recently ordered this lot of six Monel processing kettles equipped with Monel heating coils, outlets and valves. Monel was specified by the customer because of its resistance to attack by the corrosive chemicals handled.*

**LITHOGRAPHY.** *Special Monel hopper for holding gelatine compound used in lithographic processes. Made of light gauge Monel sheet, locked seam and soldered. Printing establishments, photographic studios, and concerns having photographic, photostat and blueprint departments require hoppers, sinks, containers, and other equipment made of corrosion-resistant Monel.*

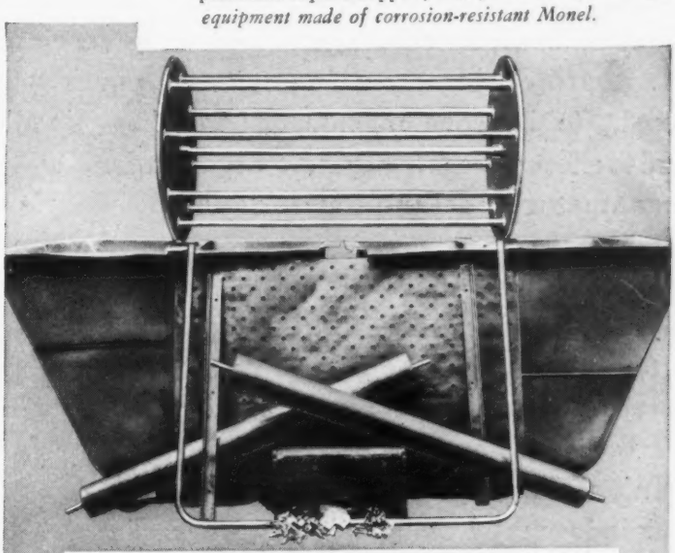
## *Do they know you can make them jobs they need . . . jobs like these . . . of MONEL?*

YOU don't have to go *far* to land profitable jobs: Call on your neighbors. For as you see, Monel* is used in so many widely different industries, you find plenty of prospects who need it all about you.

Most of them know their Monel. But do they know YOU are equipped to fabricate this rust proof Nickel alloy to their needs? There's no one better than yourself to tell them.

Take these two pages with you and start out. Remind the buyer that Monel not only is rust proof and resists corrosion but is stronger than bridge steel and therefore long-lived. Suggest it to him for uses BESIDES the ones he already knows. And for complete working instructions, write to-day to

**THE INTERNATIONAL NICKEL COMPANY, INC.**
**67 Wall Street** **New York, N. Y.**



**TEXTILE PLANTS.** *Monel dye tank linings, perforated false bottoms, reel and roll parts used in a dyeing machine. The order for this Monel equipment was received from a user in far-off South America. Contact the dyehouses in your vicinity and discuss with them your ability to supply Monel parts and equipment.*

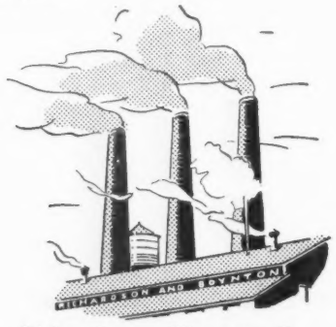
# MONEL

*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled and marketed solely by International Nickel.

INCO MONEL

# "MORE FOR THE MONEY"

WHEN the cost of living rises, manufacturers must more than ever seek to offer improved quality while maintaining or even lowering prices.




*Richardson and Boynton Co. Plants—Dover, N. J., Buffalo, N. Y. and Whitesboro, N. Y.*

Alert companies watch their overhead as a matter of course. Ways are constantly being sought to improve methods and to effect savings in buying, manufacture, selling, and office expense.

**We have now found it possible to effect important economies by enlisting the services of a modern factoring organization.**

We are again pioneering in our industry by the appointment of William Iselin & Co., Inc. to handle our credits and collections. Thereby we dispense with a costly department of our own, and avail ourselves of their special facilities and resources.

The Iselin Company was established in 1808, and enjoys the highest reputation at home and abroad. We are proud to be associated with them, as are so many large companies in various other industries.

**The cost to us of their service represents a large saving in our total fixed overhead, and this reduction will substantially contribute toward our continuing to give our customers the highest possible quality at the lowest possible prices.**

To insure uninterrupted and customary service to our customers, our key credit personnel has joined the Iselin organization, and since the Iselin Company's compensation is on the volume of our business, their liberality in approving credits and handling the accounts of our customers goes without saying.

We are convinced that our customers will find our arrangement with this company eminently satisfactory.

**Aside from the economies effected, this arrangement will enable us further to concentrate our attention and resources upon research, laboratory work and manufacturing, and to enlarge the market for our products.**

This means that R. & B. —famous for quality for a hundred years — are leaving

*William Iselin & Co., Inc. Main Office—New York City*

no stone unturned to make available to you new improvements and innovations in heating and air-conditioning, and are determined to use every practical means to permit you to offer "more for the money" when you install R. & B. products.

*Established 1837*

**RICHARDSON and BOYNTON Co.**

**244 Madison Avenue, New York Branch Offices in Principal Cities**

# THE "WINDS OF TIME" *Bring no Duct Failures*

• Only a metal as durable as ARMCO Ingot Iron could have withstood the corrosive action of twenty-three years in this ventilating system.

ARMCO Ingot Iron ducts were installed in this office building in 1914 and when inspected recently were found to be in excellent condition. Such durability was of prime importance, as early duct failure would have meant costly tear-outs and repairs.

Experiences like this are also important to your customers. Here is evidence that gives them strong *reasons why* they should install sheet metal work made of ARMCO Ingot Iron. They'll quickly appreciate the economy of buying a metal with such a long-established record of durable service. Talk ARMCO Ingot Iron and win easier, more profitable sales as well as satisfied customers who will call again.

The nearby Armco Distributor has ample stocks of ARMCO Ingot Iron. For fast delivery place your next order with the Armco distributor salesman or write direct. Also ask him about the free services that he offers to help you get more business. The American Rolling Mill Company, Middletown, Ohio.

## ARMCO INGOT IRON

**Confidence**

BUILT ON SERVICE

**ANOTHER BIG DIFFERENCE BETWEEN GENUINE PARKER-KALON SHEET METAL SCREWS AND IMITATIONS**

**THIS INSTRUMENT**

**DEVELOPED BY PARKER-KALON**

# DETECTS INACCURACY OF $\frac{1}{1{,}000{,}000}$ INCH

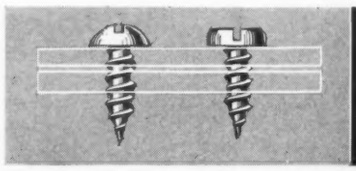
**Here you see our MICRO-COMPARATOR . . . an amazing instrument that is capable of detecting variations as minute as one-millionth of an inch. It was developed and built by Parker-Kalon to check the master gauges which safeguard the accuracy of the production gauges for Parker-Kalon Screws. With it an optical magnification of a mechanical reading is obtained. A specially air conditioned, vibration-proof room had to be provided in the Parker-Kalon Laboratory for this instrument.**

This is just one of many important aids in maintaining uniformly high standards of quality which are available in the famous Parker-Kalon Laboratory. It is just one of the reasons why genuine Parker-Kalon Sheet Metal Screws give UNIFORMLY PERFECT RESULTS in contrast to the uncertain action of imitations that "look the same".

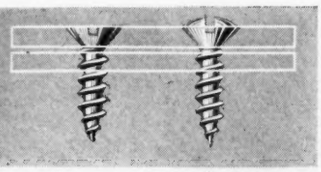
Nothing to compare with Parker-Kalon facilities for securing and controlling the essential qualities of screw products is known. Added to Parker-Kalon's experience of over 20 years in making Sheet Metal Screws, such control over quality assures you of fastening economy. It guarantees that genuine Sheet Metal Screws will work right every time . . . that savings of assembly time and labor will never be wiped-out by trouble.

It is important to specify PARKER-KALON Sheet Metal Screws. *They always hold* because threads run full diameter right to the head. They *always go in easily* because the threads are designed for the work they must perform and held to a high degree of uniformity. *Their threads don't strip, nor do the heads twist off* because they are made from a special analysis wire and are hardened by an exclusive process.

PARKER-KALON CORP., 190 Varick St., New York



**PARKER-KALON**
**HARDENED SELF-TAPPING**
**Sheet Metal Screws**
PATENTED NO. 1,685,148



**PARKER-KALON PRODUCTS ARE SOLD ONLY BY RECOGNIZED DISTRIBUTORS**

# Men and Materials make the Job

● And Youngstown has the material to back up your men. Uniformly ductile, with ample weight galvanizing for the job, Youngstown sheets lock up just as well on a reverse bend as on a straight run.

Youngstown believes that uniformity in base metal and coating is paramount. And Youngstown assures uniformity by inspection checks, at every step in the production of the steel, of the rolling and the galvanizing.

Buy Youngstown galvanized sheets and your jobs will help pay you a full profit. Better workmanship will make more satisfied customers. Faster duct installation will make your contracts follow their schedules, and you will make more money.

**THE YOUNGSTOWN SHEET AND TUBE COMPANY**

*Manufacturers of Carbon and Alloy Steels* • General Offices • Youngstown, Ohio

SHEETS • PLATES • TUBULAR PRODUCTS • CONDUIT • TIN PLATE • BARS • RODS • WIRE • NAILS • UNIONS • TIE PLATES AND SPIKES

10-1

# YOUNGSTOWN

# DO YOU BELIEVE IN TRADE-MARKS?

AMERICAN NICKELOID
ANACONDA
ARMCO
AUER REGISTERS
BARRETT COMPANY
BLACK & DECKER
F. DIECKMANN ELBOWS
DUSTOP FILTERS
EMERSON BLOWERS
FALCO ALUMINUM
GOLDEN STAR SHEETS
HOLD-HEET CONTROLS
INDEPENDENT REGISTERS & GRILLES
KEASBEY & MATTISON ASBESTOS SHINGLES
KEYSTONE COPPER STEEL
MINNEAPOLIS-HONEYWELL
MONCRIEF FURNACES
NIAGARA FURNACES
PARKER-KALON
PECORA CEMENT
SUPERIOR GALVANNEALED
THOMPSON "370 SPECIAL" PAINT

Certainly you do. If there is any doubt about it, consider your automobile, radio or even your last ticket to a "movie." Wasn't a name . . . and what that name stands for . . . an important factor in deciding the make you bought or the theatre to which you went?

Your prospects buy things in just the same way. Confidence, inspired by the good selling practice of pointing out the trade-marked materials to be used, has put many a signature on the dotted line. Try it and see . . . with materials you can always get quickly from Osborn. You will find that it makes a big difference in closing a sale and in the price you can get for the work.

A DEPENDABLE SOURCE OF SUPPLY FOR 79 YEARS

THE J. M. & L. A. OSBORN Co
Manufacturers—Distributors
BUFFALO—CLEVELAND—DETROIT
*Metals and Metal Products*

# BLOW PIPE WORK

## THAT'S WHERE SHEETS GET PLENTY OF PUNISHMENT

SUPERIOR GALVANNEALED excels for outside work—such as collectors—and interior pipe and fittings subject to corrosion from condensation and moisture. This sheet has a hot-dipped zinc coating, heat-treated — providing an ideal surface for paint, lacquer or enamel finish.

● To insure leak-proof blow pipe work, sheets get plenty of abuse in forming, pounding and riveting. A sheet must be "plenty tough" to stand the gaff in a blow pipe shop without fracturing at seams and rivet holes.

"We specialize in blow pipe work which is very exacting and that's why we prefer SUPERIOR Sheets. Good work requires good sheets and we certainly pride ourselves on our work."

SUPERIOR sheets are uniform — flawlessly coated — the finest sheets that money can buy.

**THE SUPERIOR SHEET STEEL CO.**
**Canton, Ohio**
***Division of Continental Steel Corporation***

**SUPERIOR**

**PEN HEARTH STEEL SHEETS**

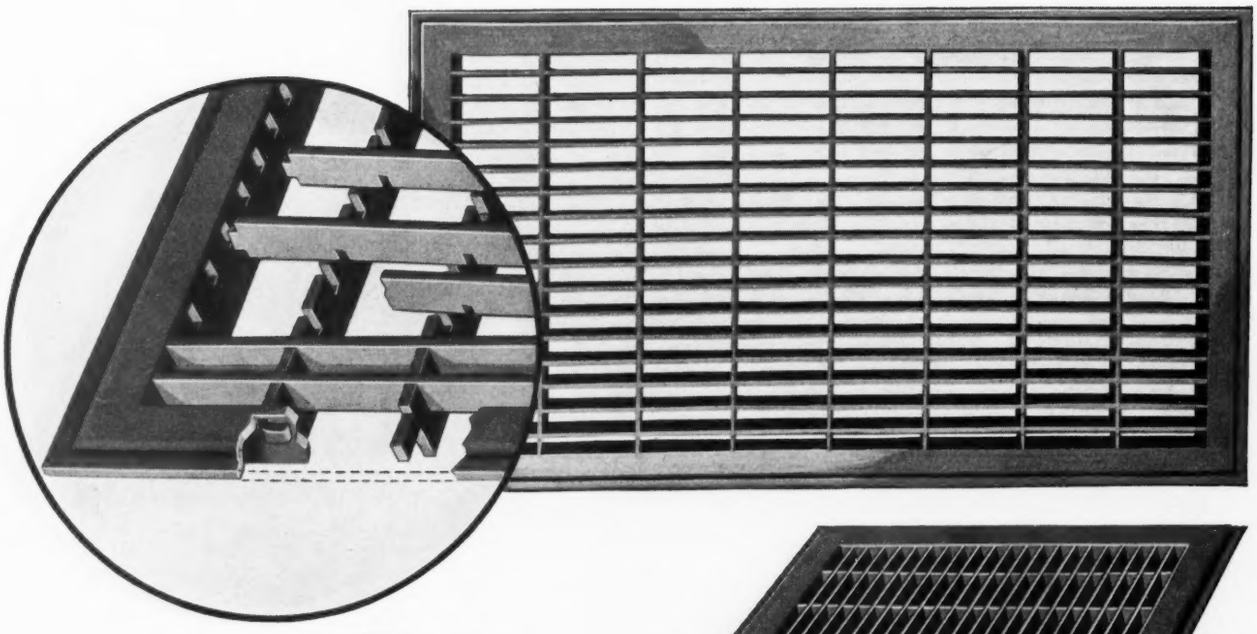
PERIOR GALVANNEALED
UPER-METAL"

GALVANIZED SHEETS
GALVANIZED ROOFING

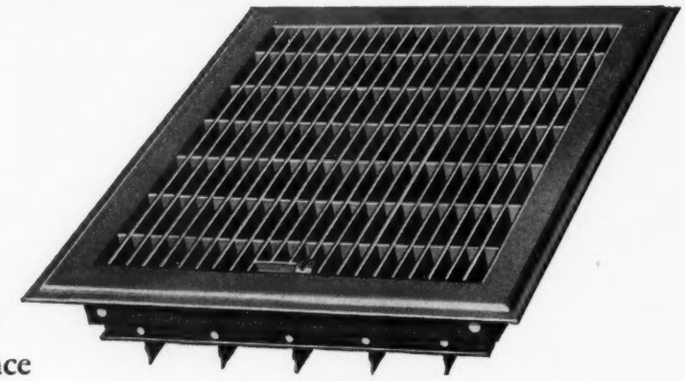
HOT ROLLED ANNEALED
PICKLED and

# INDEPENDENT "Fabrikated"
(REG. U. S. PAT. OFF.)

## FLOOR REGISTERS AND COLD AIR FACES



### Close Mesh



CLOSE mesh registers are considered by many to present a finer appearance than those of standard mesh. Their strength and rigidity are greater. Visibility through the openings is lower and the smaller openings more effectively prevent objects from becoming caught or passing through. This close mesh opening is the same size as that of "Fabrikated" air conditioning registers and grilles. Independent Close Mesh Floor Registers and Cold Air Faces lend a modern effect to any installation. *Send for catalogs.*

THE INDEPENDENT REGISTER CO.
3741 EAST 93rd STREET CLEVELAND, OHIO

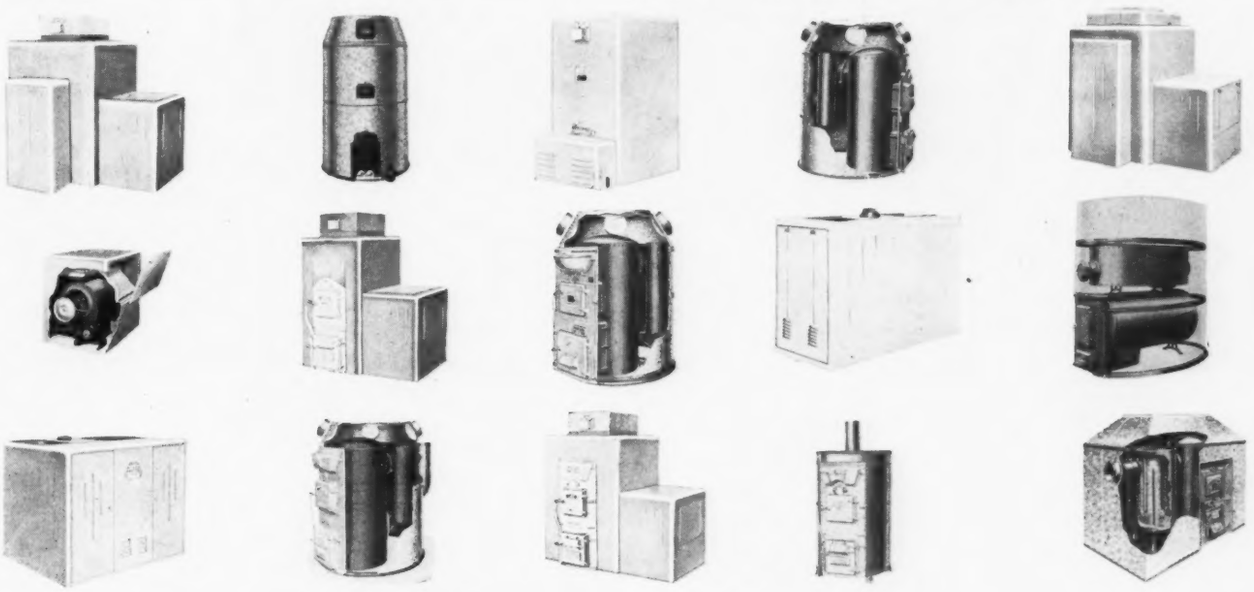
ORIGINATED AND PERFECTED BY INDEPENDENT REGISTER

# *Sell the Leading Lines*
# OF WARM AIR AND AIR CONDITIONING EQUIPMENT FOR ALL FUELS

# WEIR MEYER

Marching through the years since the days when furnaces first challenged stoves as home heating devices, this Company has consistently been a leader and, today, is known coast-to-coast for its soundness and dealer-fair-treatment as well as the quality and completeness of its lines. With the advent of air-conditioning, our lines have expanded and now embrace every requirement for all fuels.

Built by warm-air furnace men who have been making STEEL warm-air furnaces for over a half-century and who KNOW the engineering requirements of warm-air circulation and air-conditioning as taught ONLY by EXPERIENCE, these outstanding lines offer you profit possibilities supported by the kind of quality and integrity that produce continuing success, causing WEIR-MEYER dealerships to last year after year.



## *Progressive Dealers Know That Here Are Five "Star" Reasons for Selling These Lines:*

THE MEYER FURNACE COMPANY

PEORIA, ILLINOIS

Established 1866

*Manufacturers of*

WEIR AND MEYER STEEL FURNACES AND DOMESTIC AIR CONDITIONING APPLIANCES

*"WHO MAKES IT MAKES A DIFFERENCE"*

(Sign—or clip to your letterhead)

The Meyer Furnace Company, Peoria, Ill.

Send the details of your dealer franchise.

Send us your FREE architect's scale-rule (pocket size).

JUST A HABIT!
Bound by habit, thousands of users of pipe and sheets continue to contribute to the billion-dollar orgy of rust and corrosion by using ordinary ferrous materials for all types of applications. • Others, however, refuse to suffer needless loss of time and money due to premature failures and frequent replacement. Where corrosion is a deciding life factor, they use Toncan Copper Molybdenum Iron—the alloy that is industry's ally in curbing rust and corrosion. Write for information.
REPUBLIC STEEL
TONCAN IRON
HIGHEST RUST-RESISTANCE IN ITS PRICE CLASS
Toncan Iron is available through distributors in pipe and sheets and may be had in bars, plates, roofing, siding, tubing, boiler tubes, bolts, nuts, rivets, wire, welding rods, ground rods and corrugated culverts. . . . For ordinary service, these Republic products may be had in steel or copper-bearing steel.
Republic Steel Corporation
GENERAL OFFICES . . . CLEVELAND, OHIO

• Every month leading trade publications carry the story of Republic steel products to all branches of industry. The advertisement reproduced above is one in a dramatic series which illustrates the false economy of using ordinary ferrous materials where conditions of service dictate the low-cost, rust-resisting iron alloy—Toncan Copper Molybdenum Iron.

If you are not stocking and using Toncan Iron, now is the time to do so—and to cash in on the rapidly-growing preference for this modern sheet metal. Write for full information.

*When writing Republic Steel Corporation for further information, please address Department A.A.*

AMERICAN ARTISAN

Volume 106 Number 6

## What Am I to Do?

A reader of American Artisan with whom we have exchanged letters over a period of years and know as a conscientious, sound thinking business man writes as follows:

"I own a shop in a town of about 50,000. There are four other shops here. I hire all my own work done, have a bookkeeper, and keep busy myself hustling jobs, collecting and etc.

"There is plenty of work here now, but when I get a job I have to meet the other fellow's price. The general contractors do not make any bones about showing the other fellow's bid and telling you if you can meet it or cut it, you can have the job. I am not getting any work, for the simple reason I can not meet the other fellow's prices which are too low. I know as near as anyone can, the cost of doing work and am getting beat on most of my proposals. I figure 25% overhead, work the best union mechanics I can get, have worked at the trade myself for 25 years and should know what to charge for labor. In all the other shops, the owners do their own work, with a helper or possibly one mechanic. If they make wages they are satisfied.

"If I have to go to work with the tools again, I am wondering if it would not be better to just close the shop and go and get a job and get away from all the worry of trying to make ends meet.

"In the last year the shops here should all have been making money, but not one of them has made more than a living. I have tried to organize the shops but each owner thinks he is the Big Shot of the trade and as long as he can land a big job, he is a Big Business Man.

"What is a man to do?"

Obviously, this man's situation is not unique. The same condition exists in towns everywhere. And because this reader's eyes are wide open, he cannot be satisfied with trite recommendations or stock phrases. There can be little benefit to him in those business Babbitisms which suggest that he sell service, or quality, or reputation—that he branch out into new activities—and yet, if he is to survive, he must turn to these very things, because there is no other course to follow.

Service, quality of work, reputation, new activities—these can be sold. They are being sold by contractors facing or having faced this man's situation. The problem is—exactly how?

What this reader needs is specific recommendations covering plans of operation which have proved successful under actual operation. We know that in this industry there are contractors who are now making money in the face of conditions similar to those described. These contractors are invited to submit in the form of a letter an outline of their plan and how it is made to operate. Contractors submitting suggestions will be helping this reader and also lending aid to hundreds of others—so far voiceless.

What would you do?

◆

## The Labor Problem

Repeatedly, during the past few months we have called attention to the shortage of trained and skilled mechanics in our industry. Reports indicate that the shortage has been growing more acute from month to month and may be widespread if building continues at its present level.

It has been interesting to note here and there in the reports sent to us,. statements to the effect—"there is a shortage of good mechanics, but no shortage of poor men." This situation seemingly prevails in other industries as well as in ours.

For instance, a survey recently made by Warner & Swasey Co., of Cleveland shows that in the machine trade 195 firms reported a shortage and 34 firms said no. Of interest is the statement that 182 firms reporting in this survey said few if any men hired came from the ranks of the unemployed; 39 companies said they hired men from government or public projects. One company said—"Out of 300 men employed from relief rolls, all but 35 of these men quit or were released. The rest either are unwilling to work or lack skill."

Without having any definite reports to follow, it is reasonable to assume that this same situation exists in our industry and that there is little hope of filling needs from men out of work. As in other industries three courses are open—

1—Keep hiring unemployed and shifting out the poor ones.

2—Take inexperienced unemployed into the shops and train them.

3—Co-operate in some plan of apprentice or mechanic training individually or with public schools or with other employers in the community.

It is because this situation exists that we are publishing plans for apprenticeship and mechanic training now operating in various cities. If the shortage continues, some such plan will have to be adopted by all communities and because it takes time to train men, the quicker the plan is started the sooner the condition will be alleviated.

# Extraordinary Protection Against Leaks and Seepage

**The Tri-State Telephone Building, St. Paul, Minn., contains an extraordinary amount of flashing. This trend toward absolute protection against water penetration is one of the interesting developments of modern large building construction.**

**The exterior is flashed above the granite first floor, under and above all window openings, at all parapets, at all ornamented courses.**

WHEN the Tri-State Telephone and Telegraph Company of St. Paul, Minnesota determined to erect a new office building, the board of directors specified two fundamental requisites—first, that the building should be as beautiful as modern architecture could evolve and, second, that this beauty of line and material should never be marred by water streaking or penetration.

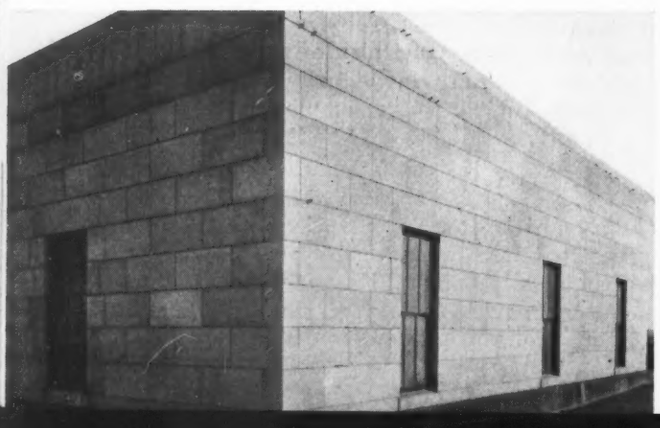
To insure the beauty of line and color specified, the architect, C. H. Johnston of St. Paul, selected Minnesota granite for the first floor and Kasota stone for the eight upper floors and pent house to carry out the color motif. The general contract was awarded to the Paul Steenberg Construction Co., of St. Paul.

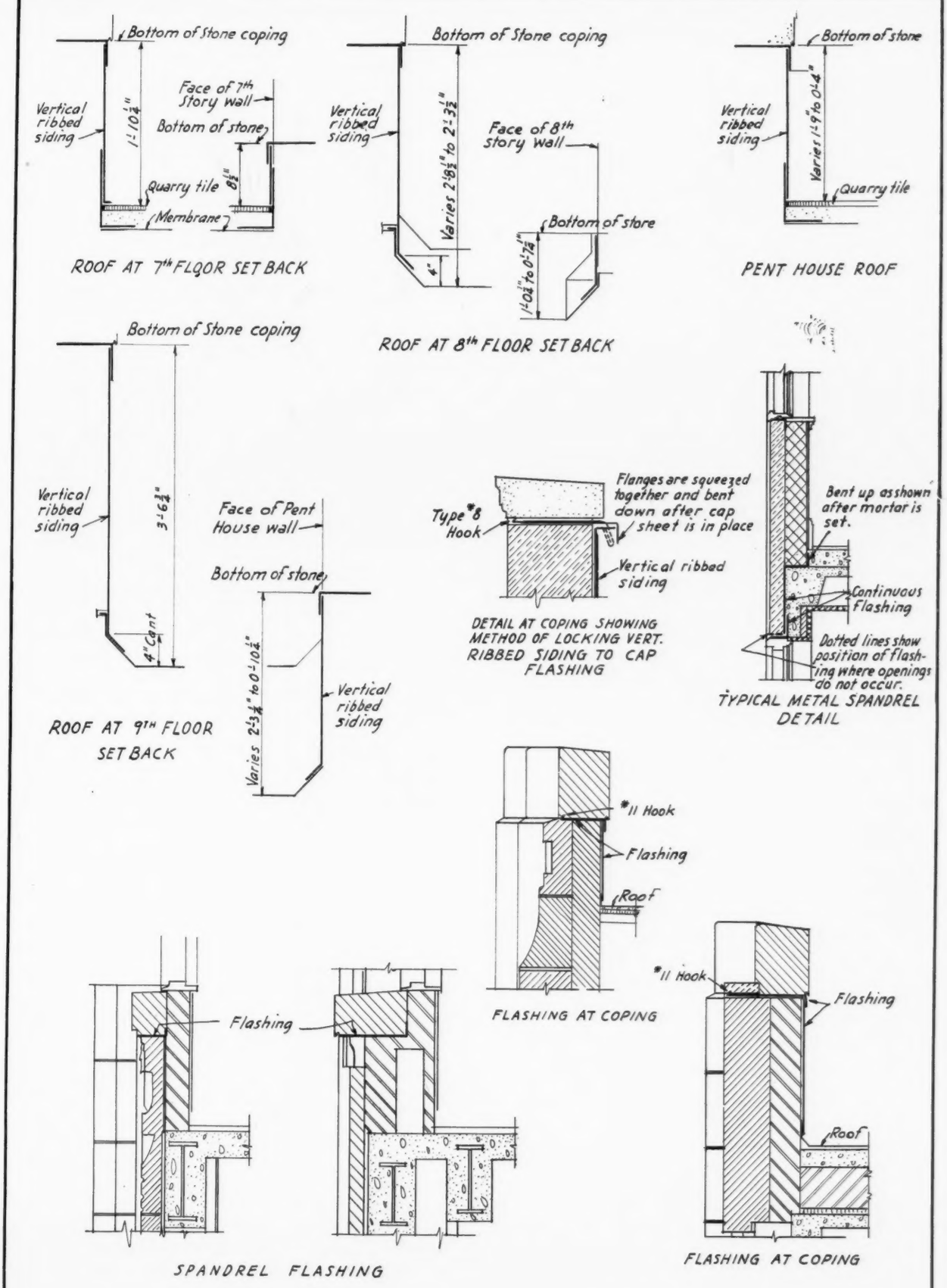
To meet the second requisite, the architects specified water protection to a degree seldom encountered in large building construction even in this year of more than ordinary attention to the all important problem of keeping water out of walls and directing any water penetration outward before damage is done.

As shown in the details, the building is flashed at every possible point where water penetration is likely to be encountered. Interesting in this connection, is the fact that whereas in an average building of this size (80 feet by 120 feet deep) an average of perhaps $300 or $400 worth of flashing might have been used, on this building more than $5,000 worth of Cheney flashing was built integral with the structure. Although this building is unusually well flashed, it is becoming apparent that architects are using more and more flashing to keep water out of buildings or from marring beautiful exteriors—one evidence that the construction industry is paying heed to past destruction of some of the country's outstanding buildings.

The contractor installing the flashing and the roofing was the Joseph Haag Roofing and Cornice Company of St. Paul. To give some idea of the extent of his contract and to indicate where this amount of flashing was installed, it might be said that the vulnerable points determined by the archi-

**The pent house (left) is base flashed with ribbed siding in short lengths as shown. The parapets (right) have ribbed siding locked to through wall flashing under the coping cap and nailed to the wall. The siding serves as roof flashing. This construction permits "breathing" in the wall and keeps water out.**




Bottom of Stone coping
Vertical ribbed siding
1'-10¼"
Face of 7th Story Wall
Bottom of stone
Quarry tile
8½"
Membrane
ROOF AT 7th FLOOR SET BACK
Bottom of Stone coping
Vertical ribbed siding
Varies 2'-8½" to 2'-3½"
Face of 8th story Wall
Bottom of store
4"
1'-0¼" to 0'-7½"
ROOF AT 8th FLOOR SET BACK
Bottom of stone
Vertical ribbed siding
Varies 1'-9" to 0'-4"
Quarry tile
PENT HOUSE ROOF
Bottom of Stone coping
Vertical ribbed siding
3'-6½"
4" Cant
Face of Pent House wall
Bottom of stone
Varies 2'-3¼" to 0'-10¼"
Vertical ribbed siding
ROOF AT 9TH FLOOR SET BACK
Flanges are squeezed together and bent down after cap sheet is in place
Type "B" Hook
Vertical ribbed siding
DETAIL AT COPING SHOWING METHOD OF LOCKING VERT. RIBBED SIDING TO CAP FLASHING
Bent up as shown after mortar is set.
Continuous Flashing
Dotted lines show position of flashing where openings do not occur.
TYPICAL METAL SPANDREL DETAIL
"11 Hook
Flashing
Roof
FLASHING AT COPING
Flashing
SPANDREL FLASHING
"11 Hook
Flashing
Roof
FLASHING AT COPING

**In applying the ribbed siding, the top of each sheet was locked to the through wall flashing under the coping cap. The siding sheets were nailed vertically on 14-inch centers and locked to adjoining sheets. The bottom is turned out over the cant block. See details for exact construction.**

tects were all clerestory walls rising from roofs or decks, horizontal joints beneath coping stones, parapet walls around roofs and decks, the second floor belt course where the granite meets the Kasota stone, and all window sills and lintels.

How the flashing was applied to these vulnerable points is indicated in the various details from the building. The application is such that water is kept out of the walls so far as possible, but where any water might penetrate the wall there is additional protection in the form of through wall flashing which carries interior wall water outward or inward according to the type of wall.

As can be seen, the windows have both lug and slip sills, but on both types through wall flashing is used. Similar through wall flashing is used as shown on the details where ornamented or belt courses project behind or ahead of the wall beneath.

### Parapet Protection

Of much interest are the parapets. Ordinarily where high parapets are plastered or cemented on inside surfaces all "breathing" is stopped and any water which enters the parapet wall must find its way down through the wall for it cannot work to the outside. In this building, "breathing" is provided by covering the inside face of all parapets with vertical ribbed siding of Cheney manufacture applied as shown in one the details. This ribbed siding was delivered to the job cut to correct height and marked for the particular wall on which each piece was to go. This ribbed siding also acts as base flashing for the 20-year built-up and bonded roof and also for the walking tile decks. The photographs show the siding under construction on two of the parapet walls. The flashing, as indicated in a detail, is locked into the through wall flashing beneath the coping stone. The siding then extends down to the roof as a single sheet where the bottom few inches is turned out over the cant block of the built-up roof. The siding is held in position by nailing on about 14-inch centers up the inside edge.

### Water Action in Siding

The wall so protected is waterproof from rain driving against the copper siding, while at the same time any water which enters from the outside surface can work through into the air pockets formed by the keys of the siding and trickle down these keys onto the roof. The wall therefore, is allowed to sweat, being unsealed on either side. These air pockets also afford some insulation to the wall and provide the mechanical means whereby the siding can expand and contract although each sheet is nailed to the wall along one edge. Siding, not so high, was installed as a cap flashing around the pent house as shown in one of the illustrations.

As a further indication of water protective measures, there was more than 12,000 square feet of Cheney Copperkote (2 ounce copper on waterproof sheathing paper) used instead of membrane waterproofing over all spandrel beams throughout the building and at several other locations where through wall flashing was not considered necessary.

The Haag contract required more than 3,600 square feet of vertical ribbed siding and almost 3,000 linear feet of through wall flashing.

# The Fort Wayne, Ind., Licensing Ordinance for Warm Air Heating

THE city of Ft. Wayne, Indiana has passed its licensing and heating installation ordinance. As reported from time to time, this new city act has been under consideration for a long time. The members of the heating contractors' committee feel that this ordinance gives ample protection for the legitimate operator but no consolation to the sharp shooter. Here is what the committee says—

"We are pleased with the ordinance as written, and have been assured we will have the cooperation of the city officials in it's enforcement.

We are satisfied we have a real ordinance, really workable in this city, and one that will be a benefit to all concerned. It might have been made to cover more thoroughly air-conditioning, as it applies to summer cooling, but we have been assured that as time goes on, and we need amendments to govern, such amendments will have the support of the officials in enactment.

We call attention to the fact that the latest addition of the Standard Code and the Mechanical Code; the A. S. of H. & V. Guide; Standard Practices in Sheet Metal Work become our indicator, and applicable in any and all cases where specific coverage in the ordinance is lacking.

Any electric wiring is to be performed only by licensed electrical contractors; however Sec. 65 gives us the repairing; servicing and maintainance of any and all controls; we also hold the installation of any controls classed as low voltage; oil burners, gas burners, and all piping is left to us as licensed under the ordinance.

Attention is called to Sec. 6, which gives any one aggrieved the right of appeal from any decision made by the inspector. To Sec. 98-b requiring report of any and all equipment being delivered for installation, by the trucker or delivery agency. To Sec. 98-c-a penalty for over-selling, under-delivery or misrepresentation of equipment offered for sale. Note, also, that the license is made only to qualified men, not to any firm or corporation, and is subject to revocation in any case of failure to comply with the provisions, due to lack of knowledge, experience or falsification in securing same.

We feel we have secured passage of as complete an ordinance as is possible to enact at the present day, governing our specific line of work and flexible enough to permit work in the old house as well as to cover new and modern installations.

The ordinance covers seven branches of our industry and each branch will be listed on the license issued, and no one will be permitted to perform work for which he has not qualified and been issued a license. Several of our members will be permitted to perform only gravity warm air heating and sheet metal work, since it requires that a licensee must first have had three years experience in the division of the industry before he can be issued a license to perform that specific class of work.

We have been assured by the Mayor, that we will have enforcement if it requires the entire police force to do it, as they will be instructed to watch for work being done under this ordinance and if no permit has been secured to report same to the inspector.

Note also the absence of any authority being given any Building Commissioner, Board of Works, or other city official except the inspector of such work and his assistants.

## The Ordinance [Part 1]

### General Ordinance No. 1906

AN ORDINANCE regulating the installation, maintenance and repair of gravity warm air heating, mechanical warm air heating and air-conditioning apparatus, oil burners, gas burners, stokers and the servicing of appliances therefor and sheet metal work; providing for licenses and permits for installation of such apparatus and the supervision and inspection thereof, and penalties for violation thereof; and repealing all ordinances and parts of ordinances and amendments thereto in conflict herewith as amended this 11th day of May, 1937.

BE IT ORDAINED by the Common Council of the City of Fort Wayne, Indiana:

### Definitions:

Section 1-a. That the term "Gravity Warm Air Heating System" when used in this ordinance shall be construed to mean any and all warm air furnaces enclosed within a casing of any type and any and all appurtenances thereto or connections therewith intended to heat any building or enclosure by gravity circulation only wherein no mechanical force or equipment is applied. When plans and specifications for gravity warm air heating are found by the Inspector of Heating and Sheet Metal Work to be incomplete in detail, then the rules, regulations and provisions contained in the latest edition of the National Standard Code regulating the installation of gravity warm air heating systems as approved and issued by the American Society of Heating and Ventilating Engineers, The National Association of Sheet Metal Contractors, Inc., and the National Warm Air Heating and Air Conditioning Association shall be the guide for the performance of such work and shall be deemed prima facie as embodying the correct rules and practice for such work.

b. That the term "Forced or Mechanical Warm Air

Heating System" when used in this ordinance shall be construed to mean, any warm air appliances for heating any building or enclosure which may have attached thereto in any manner and made a part thereof, any type of fan or blower intended to stimulate or force circulation which does not qualify under either classification for air-conditioning apparatus.

c. Whenever and wherever in this ordinance the term "air conditioning" is used, it shall be construed to mean the scientific preparation and simultaneous control of the atmosphere within a building, structure or enclosure. Atmosphere being affected by such factors as temperature, humidity, motion, distribution, dust bacteria, toxic gases and ionization, preparation and equipment for their control being easily misrepresented and misunderstood, such installations, equipment, and the preparation therefor shall be classified, and shall consist of the following minimum functions without limitation, viz:

Class 1. Year-Round or Complete Air Conditioning, shall consist of preparations and equipment, as a minimum, for cooling and dehumidifying the air for summer use, to heat and humidify the air for winter use, proper and uniform circulation of the air by mechanical force the year round.

Class 2. Summer Air Conditioning, shall consist as a minimum of preparations and equipment for cooling, dehumidifying, and proper and uniform circulation of the air, by mechanical force, in the summer time.

Class 3. Winter Air Conditioning, shall as a minimum, consist of preparations and equipment to heat, humidify, proper and uniform circulation of the air by mechanical force in the winter time. The combination of functions in either Class 1, 2 and 3 shall be the minimum, and required by the seasons of the year, and shall be automatically and simultaneously controlled, to meet the specific minimum demands of the user; humidity equipment when used, shall produce as a minimum 30 per cent relative. When plans and specifications for air conditioning equipment and appurtenances thereto for air conditioning equipment submitted are found by the inspector of Heating and Sheet Metal Work to be incomplete in detail, then the rules, regulations and recommendations contained in the latest edition of the Mechanical Heating code as prepared and published by either the American Society of Heating and Ventilating Engineers, or the National Warm Air Heating and Air Conditioning Association, shall be the guide for the performance of the work and shall be deemed prima facie as embodying the correct rules and practice for such work.

d. Where the term "sheet metal" or "sheet metal work" is used herein, it shall be construed to mean any fabrication, erection, installation, repairing or replacing of sheet metal or sheet metal work where U. S. No. 10 Standard Gauge or lighter metal is used, in any and all warm air heating systems, piping, duct work, stacks, boxes, boots, fittings, etc., and any and all sheet metal roofing and siding of any type, any and all metal gutters, conductors, flashings and corrugated shapes, skylights and ventilators, metal cornices, metal ceilings, ventilating systems, blow pipe and exhaust systems, fire doors, kalamein doors and hollow trim, restaurant, kitchen and hotel equipment, excepting however, when such material is used in connection with automobile bodies and fenders, truck bodies, trailer bodies, or as a background for billboards, posters, signboards, sign painting, or where it becomes a required portion of the product of another manufacturer. When any plans or specifications submitted are not complete in detail the latest edition of the rules, regulations, recommendations and specifications and methods of application as approved and published by the National Association of Sheet Metal Contractors, Inc., in the year 1929 and known as "Standard Practice in Sheet Metal Work" shall prima facie be the guide for the performance of the work provided for by such plans and shall be deemed.

e. The term "Oil Burner" when used herein shall be construed to mean any device. for use in connection with a heating system, designed to burn fuel oil having a flash point of 100 degrees Fahrenheit, or higher, as determined by the Tag Closed Tester in accordance with the method of test adopted by the American Society for Testing Materials (A. S. T. M. Designation D 56-21) and having a fuel tank or container with a capacity of more than (10) gallons connected thereto. The term "oil burner equipment" shall include oil burners, as above defined, and all tanks, piping, pumps, control devices and accessories used in connection therewith.

This ordinance shall not apply to portable burners not requiring connection to a flue, such as oil stoves, oil heaters and oil lamps equipped with a wick or a mechanical device the movement of which is essential to flame adjustment.

f. The term "stoker" when used herein shall be construed to mean a mechanical device for feeding solid fuel in the combustion chamber of a boiler or furnace used in connection with a heating plant whether automatically or manually controlled.

g. The term "Industry" when used herein shall be construed to mean any person, persons, firm or corporation who contracts for, or undertakes to execute any work governed by this ordinance or who in the doing of such work seeks the services of or requires or permits the work of a journeyman, mechanic or other assistant; but the owner and occupant of a dwelling house may, with the assistance of any member of his family and household personally carry on in such house any work governed by this ordinance without a license therefor, and shall not then be included in the definition of "Industry"; provided that such owner shall take out a permit for any such work as hereinafter provided.

### Office of Inspector

Section 2-a. There is hereby created the office of Inspector for gravity and mechanical warm air heating, air conditioning, stoker, natural and artificial gas burner, and oil burner installations and for sheet metal work. This inspector shall be called "Inspector of Heating and Sheet Metal Work;" and shall be appointed by the Board of Public Safety, subject to the approval of the Board of Health. He shall give his entire time to the performance of the duties of his office and shall not during his term of office be employed or engaged, directly or indirectly, in any manner with any person, firm or corporation eligible for license as provided herein, or enter into any contract for work for others, covered by this ordinance, or for furnishing materials, plans or specifications for others.

### Oath and Bond

b. The Heating and Sheet Metal Inspector shall before entering upon his duties, take the oath required by law for City Officials and furnish bond in the penal sum of $1,000.00 with surety to be approved by the controller conditioned for the faithful performance of his duties.

### Qualifications

c. Such Inspector shall have had three years practical experience in engineering, planning, supervising and contracting for installations of forced air heating and air conditioning and sheet metal work; or shall have at least two years of such practical training and in addition have satisfactorily completed a course of study in forced air heating and air conditioning given by a recognized technical school and must have some knowledge of the operation of gas and oil burners and stokers. He shall be an assistant in, and his work shall be co-ordinated with that of the Building Department. He shall be the Chairman of the Examining Board hereinafter provided for.

(*Continued on page 96*)

# Theory and Application of Resistance Welding‡ [Part 3]

By L. H. Frost
Welding Engineer
Electric Controller & Mfg. Co., Cleveland

WHEN applying spot welding to any specific problem one must take into consideration the factors discussed in the preceding article*, some of these being as follows: type of material to be welded, electrode pressure, and design of the welding machine itself, all of which have an effect on welding current. This article will deal with the spot welding of steel, and will show the relationships between those factors that have an effect on each other, so one may determine whether any given machine is suitably designed to furnish sufficient capacity for a given job.

### Transformer Capacity Required

For determining required transformer capacity, the curves in Fig. 4 are given. These show welding time plotted against power input, or transformer input, for welding clean mild steel of various gauges. The transformer input is given rather than transformer output, because in common measurements of welding-power requirements the input of the transformer is the quantity measured. This input is the product of the actual current required for welding, times the voltage and divided by 1000, which, of course, gives the result in kva. This kva. value does not necessarily apply to the nameplate rating on the welder transformer, since in many cases the welding transformer will actually have a power input greater than the rating. In common practice, with an average length of electrode arms and a reasonably small electrode-arm opening, the power input may be at least double the nameplate rating. In other words, if the nameplate rating of the machine is equal to the required transformer input as shown in Fig. 4, we may be sure that we have sufficient power for welding. This is for the average condition. For the extreme condition of a very wide spacing between the electrode arms and extreme electrode-arm length, more input kva. will be required. From the above, it will be seen that these curves may be readily changed to primary-current values.

In some cases it is desirable to know the secondary-current values, in which case a method now in general practice may be used. This method is to measure the open-circuit secondary voltage; and by dividing the primary voltage (at the time the secondary voltage was measured) by the secondary voltage, a ratio will be obtained. This is the ratio of primary to secondary turns. Multiplying the primary current, when welding, by this ratio gives the value of secondary current. This ratio will vary with the heat taps, so it is necessary to obtain the secondary voltages on all taps. Since these voltages range from 1.5 to 8 volts, it is evident that the ratio between primary voltage and sec-

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*"Resistance Welding—I," by L. H. Frost, AMERICAN ARTISAN, March and April, 1937.

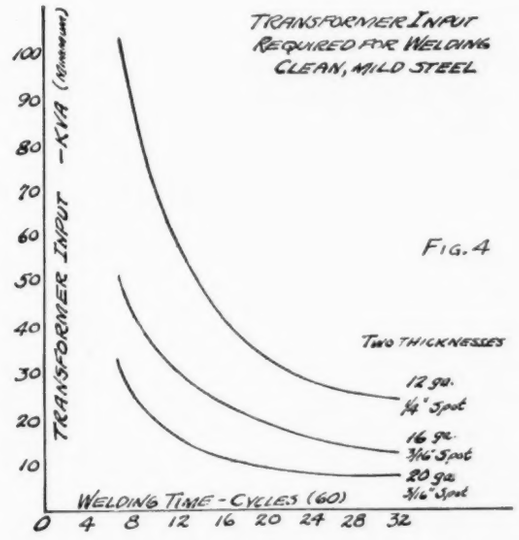



FIG. 4

**These curves apply to conventional forms of spot welders and not to special forms, such as gun welders and bar welders. The data are based on machines with a 12-in. throat depth and 12-in. electrode arm spacing. For machines having other dimensions, refer to Figs. 7 and 8.**

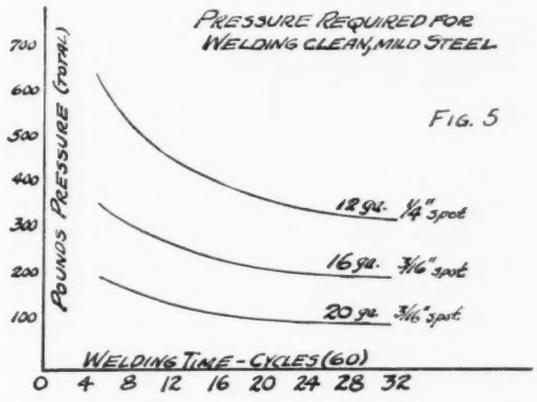



FIG. 5

ondary voltage is high, giving a secondary-current value many times that of the primary.

### Electrode Pressure for Various Gauges

Another important factor, as previously shown, is the amount of pressure with which the electrodes force the pieces to be welded into contact. The curve of pressure required for welding various gauges when operating at various welding times is shown in Fig. 5, which curve is intended for use in conjunction with Fig. 4. It will be noted that the required pressure increases with shorter welding time, and this is owing to greater pressure being required for forging the work together in the short time interval. As the time increases, a greater portion of the metal becomes softer, hence less pressure is required for forging while welding. Also, the

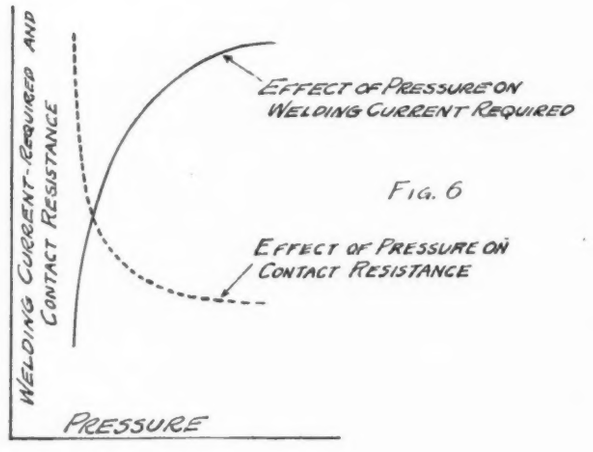

WELDING CURRENT-REQUIRED AND CONTACT RESISTANCE
EFFECT OF PRESSURE ON WELDING CURRENT REQUIRED
EFFECT OF PRESSURE ON CONTACT RESISTANCE
PRESSURE

FIG. 6

higher pressure prevents flashing or burning of the welds due to the high current required. Higher current is required for short-time welding than for long-time welding because more heat is required to raise the metals to a given temperature in a shorter time.

For the curves shown in Figs. 4 and 5, the size of the spot is given. If larger spots are required, more power will, of course, be required as well as more pressure. The spot sizes given are those in average use. Pressure, it will be noted, is the total pressure and not the pressure per square inch.

One of the curves in Fig. 6 shows the effect of pressure on contact resistance. It is the contact resistance which supplies the necessary concentration of heat for welding, which fact was brought out in the previous discussion of thermal gradients (refer to Fig. 3). This curve in Fig. 6 shows the effect of pressure on contact resistance. Actual values are not given since these vary for all types of metals and alloys. The shape of the curve, however, remains the same for all conditions.

The other curve in Fig. 6 shows the effect of pressure on the welding current required. The curve, in this case, gives the change in current required to maintain a uniform heat input with a change in pressure, and does not indicate the change in current that would automatically ensue from a change in pressure. This curve, likewise, is given without actual values, since it varies for every alloy and metal. This is at variance with the curves of Figs. 4 and 5, which are sufficiently general in nature to cover a rather wide range of mild steel.

These two curves in Fig. 6 show how important it is to control the pressure within as close limits as practicable, because a small variation in pressure may mean a considerable change in the current required. This is not so evident when welding steel in long-time intervals, but does become important when welding at short-time intervals and with alloys.

### Measuring Electrode Pressure

Electrode pressure is of such importance that it is worthy of further discussion as to means of its measurement or determination. In the previous discussion, a type of pressure meter was referred to which is now available for general use, and this, of course, gives a ready means of determining the actual pressure. In those cases where the meter is not available, suitable means can usually be found for determining this pressure by measuring the ratio of levers or by suitably calibrating springs.

With the manually operated machine the foot lever and upper electrode arm are hinged, and it is possible to measure these lever arms and calculate the ratio of these levers. Then by using a known weight on the foot pedal, it is possible to determine the pressure on the work. This will be approximate only because of friction in the lever hinges. By calibrating the spring, it is also possible to determine the pressure, which would be the product of the compression of the spring in pounds, times the lever-arm ratio between the spring and the electrode.

In the case of the air-operated machine, it is only necessary to read a pressure gauge and multiply by the area of the piston in square inches to obtain the total pressure. Many motor-driven machines have a suitably calibrated spring adjustment, and in others it is possible to use the method given above for manual machines. Most motor-driven machines are cam operated, though some are operated by a crank or eccentric. In machines of the latter type, the motion of the crank is used to move the electrodes together and compress a spring, applying pressure. Since the movement of the crank is always increasing or decreasing the pressure on the work, this cannot be made uniform. Further, after a period of use, the gears and bearings become worn and it is possible to have pressure on the work for only a short period of the complete welding operation. In some cases it requires very careful adjustment of these machines to get satisfactory results.

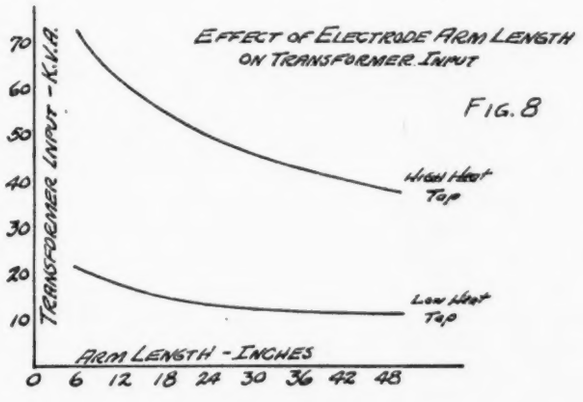
The curves in Figs. 4 and 5 give the necessary information to determine how much transformer input is required to weld two thicknesses of a given gauge of mild steel, and also the proper pressure for welding. From these curves it should be easy to determine whether existing machines have suffi-

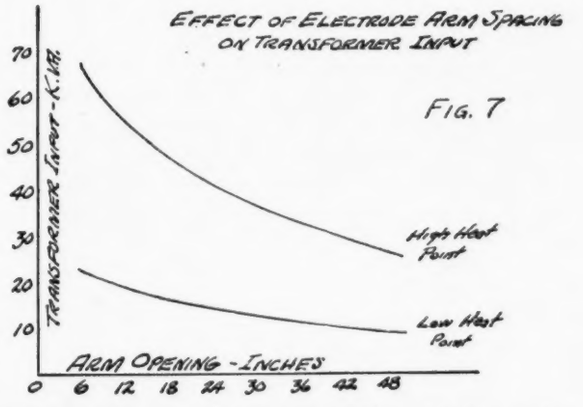
cient capacity for the work planned. As previously stated, the heat developed is the product of the square of the current, times the resistance, times the time, times the necessary constants required to cover varying conditions of electrode shape, conductivity of metals, etc. All these factors are included in the above curves.

### Spacing and Length of Electrode Arm

However, the transformer-input kva. curves (Fig. 4) are given only for machines in general use and having a throat depth of 12 in. In case the electrode arms are longer than this value, the welder will develop somewhat less welding current and require a correspondingly less power input. This is also the case for electrodes having a large spacing between arms. Since less welding current is developed and less transformer-input kva. is required, the machine will not be able to weld under the same conditions as with short, close arms, and will be, in effect, the same as a machine of smaller capacity.

Also, the curves in Fig. 4 are for an arm opening of 12 in. as well as an arm length of 12 in. The effect of greater electrode arm spacing and greater electrode arm length are shown in Figs. 7 and 8, respectively. These curves are for an average machine of 25-kva. rating with 12-in. electrode arm length and opening. They may be used for any average welder by obtaining the ratio between the present and proposed position on the curves in Figs. 7 and 8 and applying this ratio to the existing machine kva. input. The best method is to measure this input instead of using the nameplate rating, since this may not be correct, as previously pointed out.




**These curves are for an average machine of 25-kva. rating, with 12-in. electrode arm length and opening. They may be used for any average welder by obtaining the ratio between the present and proposed position on the curves and applying this ratio to the existing machine kva. input.**

### Welding Scaly Stock

For welding scaly stock, some precautions must be taken. In general, this requires either an increase in pressure or a decrease in current, or a combination of both. In the case of scaly stock the resistance between the surfaces and contact is greater than for clean steel, which results in high heat being produced at these points when current flows. In some cases, however, the scale is so tough and thick that current will not flow through the stock without increasing the pressure sufficiently to force the surfaces into intimate contact. In this case, by increasing the pressure above the optimum value, it will also be necessary to increase the current in spite of the increased resistance afforded by the scale. If too low a pressure is used, heat will be developed rapidly; and the force being sufficient to forge the pieces together, flashing will occur and the weld will be very porous in nature. Further, this flashing will cause rapid deterioration of the electrodes. There is no sure method available, nor definite data, on the welding of scaly stock, principally because the thickness of the scale and its nature vary greatly on different classes and types of steel. Thus, some experimentation is necessary when setting up for welding scaly material.

### Effect of Electrode Form

The most common form of electrode in use at present is the copper or copper-alloy electrode in the shape of a truncated cone. All curves shown in Figs. 4 to 8 are for this shape of electrode. In some cases it is desirable to use the dome or ball-end electrode, which is of advantage in welding scaly stock. These electrodes, however, are more difficult to maintain unless made from the hard copper alloys.

### To Prevent Marring Surface

To prevent mar on either of the two surfaces, a large flat electrode may be used on that side. This electrode, in general, requires more transformer input, due to the spreading action of the current in passing through the work. The increase in kva. depends upon the thickness of the work and usually will not be more than 10% or 15%.

As shown above, there are many factors entering into the welding of steel. Dirty or rusty or scaly materials are mainly responsible for variable results, because of the uncertainty of controlling surface conditions. If clean stock is used, there should be no difficulty in determining what is best for a given job.

[To Be Continued]

# A Rapid Glance at the Labor Situation

**The tabulation of the labor situation on the facing page was compiled from reports from associations. Of most interest, perhaps, are the present union and open shop wage rates and future increases if such are under discussion. We will be glad to supplement these reports with other information if contractors in non-association areas care to submit answers to the same questions. The names and addresses of reporting officials are also available.**

RECENTLY a questionnaire was mailed to secretaries of active associations and to individuals in areas of inactive association effort asking for a report on prevailing labor conditions in the association area. The results of this survey are tabulated in the report shown herewith.

While the report summarizes itself, a few high lights are worthy of mention. There have been general increases in union wage rates in most parts of the country. These increases recently made effective or likely to be effective in the near future are indicated in the table and the footnotes. There has been little discussion of reduced hours of work per week. However, trips made by the editors this year indicate that while there is little definite to report on fewer hours of work per week, there is a considerable amount of conversation going on. What may happen toward the end of this year or early next year remains to be seen.

### The Mechanic Shortage

Generally, there is a reported shortage of good mechanics all over the country. Most reports carried the comment that there seems to be plenty of fair mechanics still available, but under present prices a full day's work per mechanic is absolutely necessary if the contractor is to make a profit. Encouraging are the reports that the conscientious union business agents are doing everything possible to get a full day's work from every man, realizing that if wages are to increase there must be full cooperation or the building program will die from too high costs.

The tabulation indicates that generally there is too little attention being paid by either contractors or business agents to training of apprentices. Schools in operation are doing an excellent work, but more schools are needed. The lack of interest or downright objection to increased apprentices indicated by some local unions is to be condemned as a shortsighted policy.

### Mechanics on WPA

Non-union shops are of course, paying considerably under the prevailing union wage. Generally, such shops are most active in residential work where there is no conflict with other union trades. The unions are concentrating on work of large size or on public and semi-public work. If unionism spreads, residential work will probably fall into line. This report gives no data on prices charged for labor by contractors working with the tools and hiring no labor. It is probable, however, that their labor prices are below the wage rates for non-union shops.

### Open Shop Wages

One of the footnotes makes mention of mechanics preference for staying on WPA work rather than seeking employment with the private contractor. In the reports from the larger cities and also in letters received during the past year, this situation has been referred to many times. It would seem that in some centers large grants of money have been made for improvements with the stipulation that the materials be purchased from private firms, but the actual fabrication and erection be done with mechanics on the relief rolls.

This problem is two edged. First it eliminates work which should be done by private contract and second, it removes from the labor pool mechanics who should be available for hire.

Though it has been argued that these improvements keep men working, the facts seem to be that where mechanics are granted existing union wages, but giving each man only ten days or so work a month, we may be developing a class of workmen inclined to loaf half a month and content to live on less incomes per month or year. That this is a healthy situation is open to argument.

Further, some associations report that committees have waited upon public officials disbursing these funds and have received no cooperation or assurance that mechanics would be urged to turn to contractor employment as work opens up. The acute shortage existing in several large cities would immediately be alleviated if these mechanics were requested to seek employment.

| Area | Name of Association Reporting | Is There a Mechanic Shortage? | What Effort to Train Apprentices? | Prevailing Union Wage | Prevailing Open Shop Wage | Expecting Any Wage Increase? |
|---|---|---|---|---|---|---|
| Reading, Pa. | Sheet Metal & Roofers Assn. of Reading | No | None | No Union | $0.70 | No |
| Akron, Ohio | Warm Air Heating, Sheet Metal & Roofing Assn. of Akron and Vicinity | Yes | Yes(a) | $1.125 | No open shops | No(b) |
| Indiana | Sheet Metal, Warm Air Heating & Roofing Contractors Assn. of Indiana | Yes | No | $1.25 | $0.60 to $1.00 | No |
| Racine, Wis. | Racine Sheet Metal Contractors Assn. | Yes | Yes,high school classes | $1.25 | No open shops | No(c) |
| Ohio | Ohio Sheet Metal Contractors Assn. | Yes | Yes, in larger cities through vocational classes | $1.00 to $1.375 | $0.80 to $1.00 | No |
| Des Moines, Iowa | Air Conditioning & Warm Air Heating & Engineering Assn. | No | No | $1.25 | $0.60 | Yes, to $1.375 per hr. |
| DuPage County, Ill. | DuPage County Warm Air Heating and Sheet Metal Contractors Assn. | Yes | No(d) | $1.50 | $0.75 to $1.00 | Nothing definite |
| Northern New Jersey | Air Conditioners Assn. of New Jersey | Yes(e) | No | $1.40 | No open shops | Yes, to $1.70 per hr. —7 hr. day |
| Fort Wayne, Ind. | Sheet Metal & Warm Air Heating Contractors Assn. | Yes, good ones | Not yet | $1.00 | $0.50 to $1.00 | No |
| Peru, Ill. | Sheet Metal Contractors Assn. of LaSalle Co. | Yes | Yes | $1.15 | ? | Yes, to $1.20 Sept. 1 |
| Albany, N. Y. | Capitol District Roofing and Sheet Metal Contractors Assn. | Yes, union | No(f) | $1.20 as of May 1, 1937 | ? | No. Prior to May 1 rate was $1.00 |
| Dayton, Ohio | Sheet Metal, Furnace & Roofing Contractors Assn. | Yes(g) | No | $1.375(h) | $0.50 to $1.15 | No. Rate increased May 1, 1937 |
| Toledo, Ohio | Toledo Sheet Metal and Roofing Contractors Assn., Inc. | No | Yes(i) | $1.125 | No open shops | Will be discussed Nov. 1 |
| Beaver County, Pa. | Beaver Valley Sheet Metal Contractors Assn. | Yes | No | $1.25(j) | ? | See note (j) |
| Memphis, Tenn. | Reported by individual | Yes | No | $1.125 (40 hrs.) Time and one-half overtime | ? | Raised from $1.00 April 1 |
| Salt Lake City | Sheet Metal & Warm Air Heating Contractors Assn. | Yes | Yes, vocational training in schools | $1.00 | ? | No |
| Wisconsin | Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Assn., Inc. | Yes | Yes, state indenture system | $1.20 | $0.60 to $0.85 | No(k) |
| Carolina-Virginia | Tri-State Assn. of Sheet Metal Contractors | Sheet metal, Yes Roofers, No | No | No Union | $0.75 to $0.85(l) | Yes. To $1.00 Jan. 1 |
| Chicago | United Air Conditioning Institute | Yes | No | $1.50 | ? | Nothing definite |

(a) Are now setting up apprenticeship training for plumbing industry. As soon as this program is under way, will start similar program for sheet metal industry.
(b) $1.125 is new rate effective May 1, 1937. Old rate was $1.00 an hour.
(c) $1.25 is new rate effective May 1. Old rate was $1.20 per hour.
(d) Union does not seem interested. Union has been taking in men not properly qualified. Perhaps for additional union income.
(e) Shortage due to employment of mechanics in ship yards on WPA. Men would rather work for WPA than private contractors.
(f) Union does not want contractors to exceed quota of apprentices. Contractors now entitled to 1 apprentice to each four mechanics. Union is not permitting full apprentice quota in some shops.
(g) Union unable to furnish enough mechanics for last three months.
(h) Unions trying to organize all shops. Concentrating on public work, leaving residential heating alone for time being. Large local manufacturers recently entered installation field. Union working to organize all such inside work.
(i) The Toledo plan for training apprentices recently inaugurated. Complete plan published in May, 1937, American Artisan.
(j) Report received in April. Contractors at that time understood that scale would be raised June 1 to $1.25 per hour. No later report.
(k) Rate raised to $1.20 June 1. Previous rate was $1.05.
(l) Some contractors paying good mechanics $1.25, although open shop. Much work being done by small firms with too little experience. Experienced shops seldom get sub-contracts on residential jobs under $12,000.

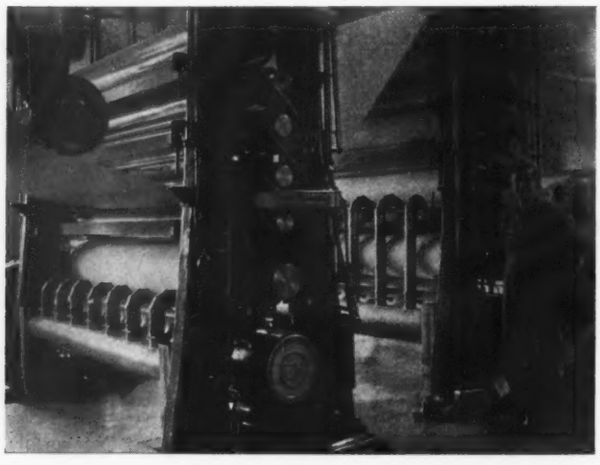
# Temple Specializes in Industrial Sheet Metal Work

IN the industrial area of southern Michigan, the J. A. Temple Company of Kalamazoo, has been known for nearly 40 years as a sheet metal contracting organization specializing in the fabrication and installation of apparatus and air handling systems for all types of industrial processing—particularly that activity centering in the paper making industry.

This reputation has been established through the years during which the Temple company has installed and designed practically all types of heating, ventilating, drying, humidifying, vapor removal systems common to paper making and has also manufactured to order or as standard items dozens of special products used in paper manufacture. This specialization has been in addition to an equally long service record in the design and installation of architectural sheet metal work and industrial or commercial air conditioning.

The extent to which the Temple company has gone in developing a technique specifically aimed at paper making is illustrated in the photographs accompanying this article showing numerous products and systems used by the paper manufacturers. Not only has it been necessary for the firm to thoroughly understand all ramifications of the sheet metal business, but it has also been necessary to keep abreast of developments in the manufacture of paper and to be prepared to handle problems arising because of changes in manufacturing technique.

**Paper machine rolls of 54-ounce copper are rolled, seamed and assembled by the Temple company to specifications.**

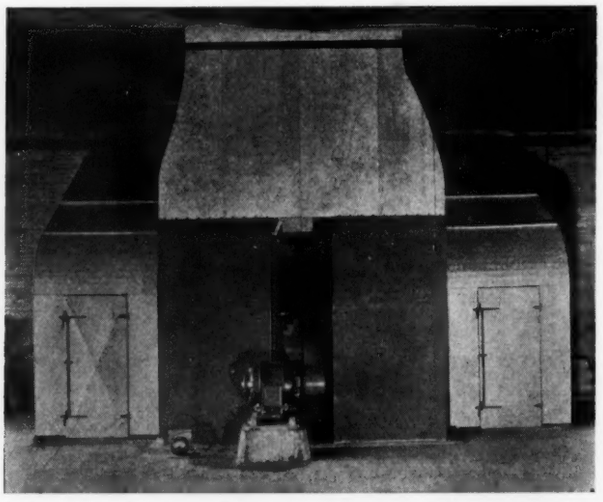


**Today, warm, dry air is introduced directly into the pockets of paper machines to absorb water vapor. This is a typical Temple installation.**

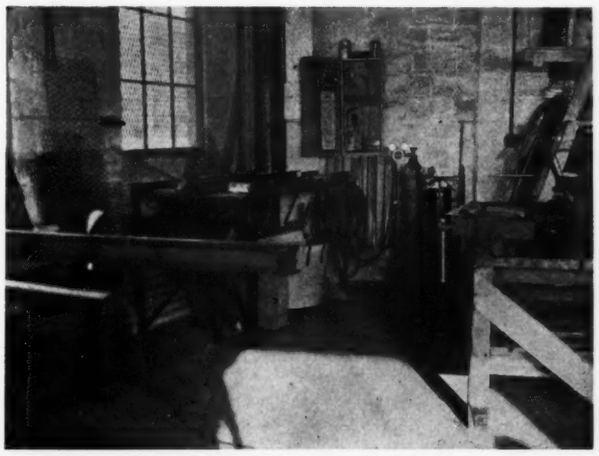
### Paper Machine Vapor

As an example, take the problem of removing water vapor from paper making machines. In the manufacturing process the paper comes from the machines saturated with water. In order to dry the paper this moisture must be removed quickly and uniformly else the machine rooms will be filled with steam and drying paper spoiled by water dripping from condensing vapor on cold walls or the roof. Early practice used hoods over the machines, but later developments brought the air drying method which introduces large volumes of warm, dry air into pockets between the rolls of the machine. The air is brought to the machine through overhead ducts from which small branches run between the rolls. Openings in the branches direct the warm air onto the paper still on the rolls. This warm air having a large absorption factor, carries the moisture out through the exhaust system without condensation occuring.

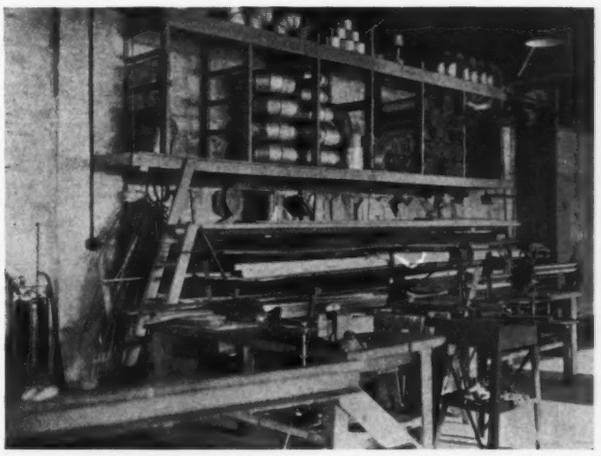
In another paper drying operation the paper is gathered in endless festoons traveling slowly through the drying room. Steam heat from coils just above the floor provide dry heat while the



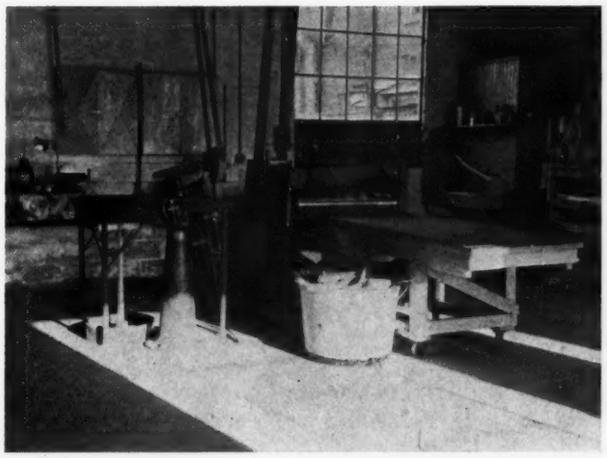
**This twin fan assembly exhausts warm, vapor-laden air from a drying room. By means of a rapid air change, condensation on roof or walls is prevented.**



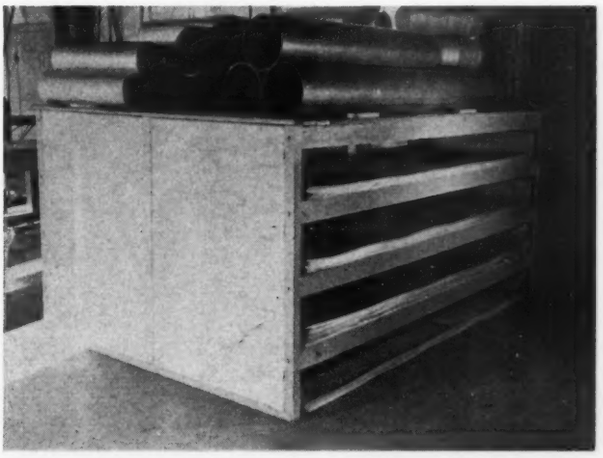
The welding corner of the Temple shop showing cabinet for torches, rails, vise and benches for supporting work.



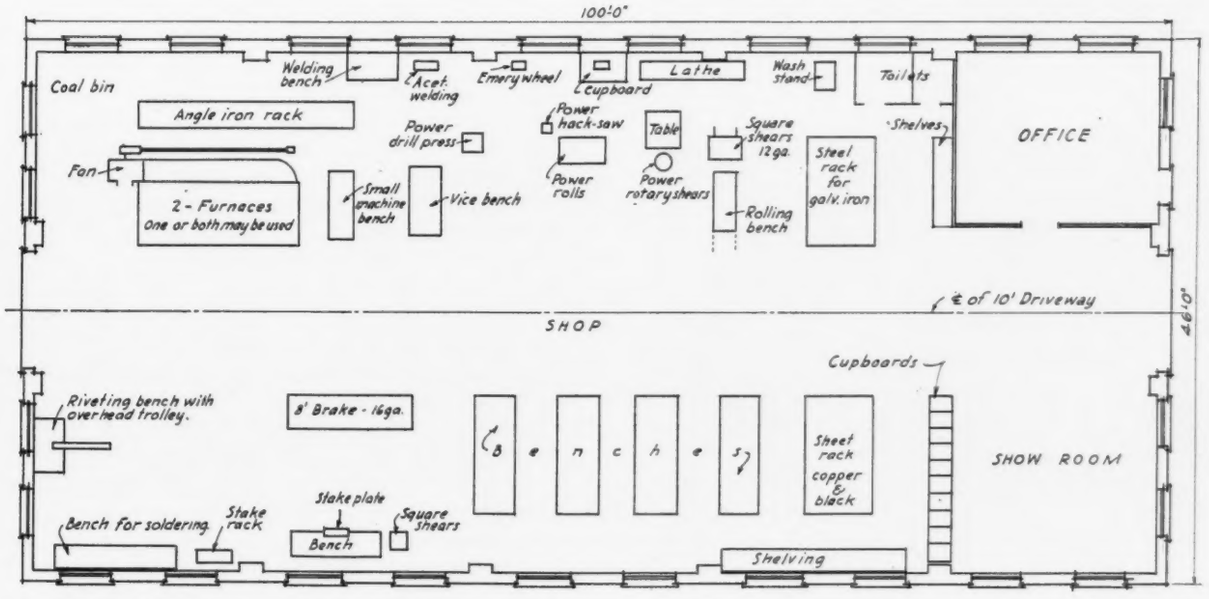
Light weight shapes are racked as shown above with machine hack saw, and small tools nearby. The shelves above hold pipe fittings.



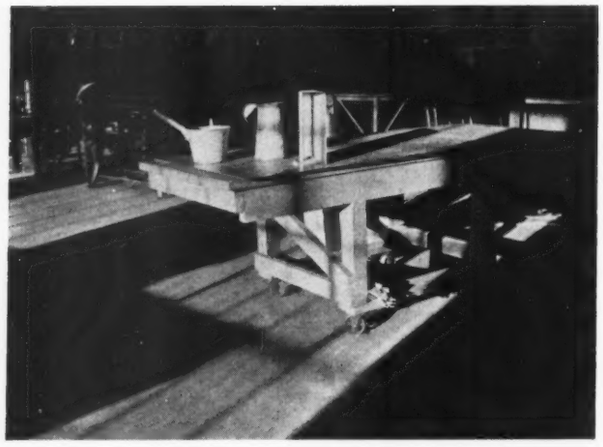
The squaring and rotary shears are grouped. Rolling tables bring work to and take work away from the machines. The lathe in the background is used for spinning metal.



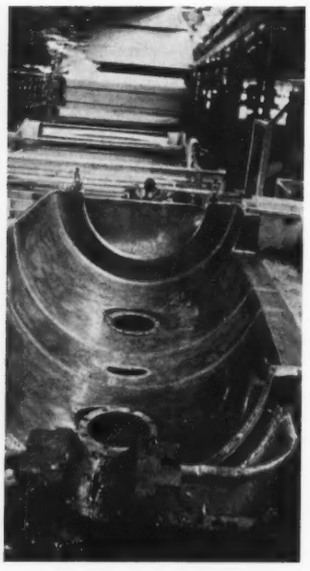
Sheets in stock are racked like this. Each shelf is marked for size and weights. The rack is near the entrance door with wide aisles on four sides so the rolling tables can be brought to the rack.



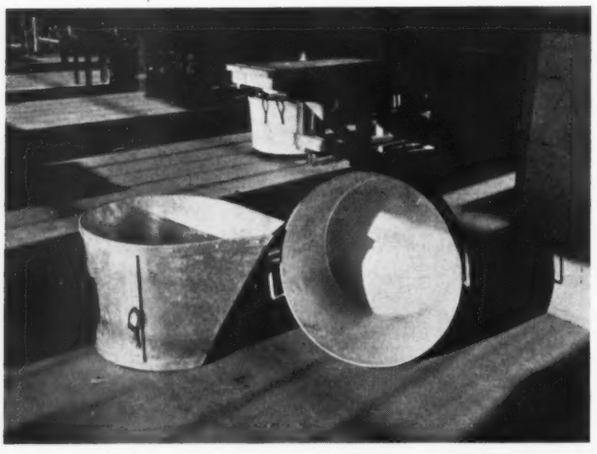

Layout of the Temple shop showing location of machines. The plan is for groupings according to machine use or progress of an average job from stock racks to loading platform. The new building is tile, brick, steel frame, concrete floor.



**Many small utensils, like these measuring containers, are made as standard items for industrial users. Photograph also shows the rolling tables.**



**At left—typical grinding wheel collecting system with hoods and round pipe. At right—48-ounce copper vat lining made to order.**



**These heavy galvanized color mixing tubs were first made experimentally. The tubs proved so superior that production is standardized. The tubs may be moved by crane or hand truck.**

vapor laden air is exhausted through a duct system opening into the outside air.

The handling of air has not been the only activity of the Temple company among paper manufacturers. Among the other products fabricated are the 54-ounce copper rolls used in paper making, sometimes many feet long and over two feet in diameter. The vats used in screening paper pulp, made from 48-ounce copper and shown in one of the photographs is another type of product fabricated.

From time to time certain products (as for example the color mixing tubs shown in a photograph) which were first made to specific order have developed into units so practical that fabrication has become a standard production item in the Temple shop. This applies to measuring cans, sampling containers, color batch pans, etc.

### Layout of New Shop

Recently the Temple company has built and moved into a new shop. Like its immediate predecessor, this shop reflects an orderliness which accounts for the company's ability to run through the shop orders requiring thousands of pounds of material or single, special items. The diagram shows the arrangement of the shop just after it was opened this past spring. Each piece of equipment is placed with regard to its use with other power or hand equipment and according to general grouping of operations. It will be noted that all welding operations are concentrated in one area; so are operations requiring the shears, rolls, drill presses, small machines. Bench work, after material is ready for fabrication, is concentrated on movable tables located along the south wall with the brake and soldering benches close by. From stock racks to loading door most operations are progressive.

### Racks and Rolling Tables

Stock racks for sheets or light weight shapes are placed to facilitate loading and removal, with each shelf or bracket marked for the particular sizes kept in stock. Movable tables have long been one of the time and labor saving "kinks" used in this shop. These tables may be loaded with sheets from stock and rolled to the machine for cutting or forming. Another table takes the stock after the operation and is rolled to the next machine or bench. These tables can also be used to extend working benches, load or unload trucks or dozens of other uses.

The firm was founded by J. A. Temple. While Mr. Temple has been identified with other sheet metal concerns in Kalamazoo he is again "leading the business" with his son Walter handling the shop and field work. Walter Temple is active in the West Michigan chapter of the American Society of Heating and Ventilating Engineers and a keen student of air conditioning. One of Walter Temple's hobbies is metal spinning and the lathe shown in the shop floor plan with the cabinet for the pins is frequently used. The art of spinning was learned from an old country artisan who years ago handled much of the ornamental metal work fabricated by the company.

# Artificial Patina For Copper [Part 1]

**The solutions and procedure described in this article cover the latest methods for obtaining an artificial patina for copper. The recommendations were developed by Copper and Brass Research Association. The recommendations supersede previous methods with their uncertain and unsatisfactory results.**

THE following method for coloring copper roofing in place has been developed by the Copper and Brass Research Ass'n. Where weather conditions, humidity and other essentials were as they should be, a satisfactory artificial green patina has resulted. The process is a relatively new one and research efforts now under way may result in further simplification of the method. The process is offered as the best available, and the assurance can be given that the chemicals are safe to use and cannot injure the copper.

### Clean Surface

After all work is completed, and before application of the coloring process, the copper surfaces to be colored must be clean. Any dirt, oil, or grease on the surface will prevent the necessary chemical attack incident to the coloring treatment. The surfaces of all copper sheet are coated with a thin residual film of oil from the rolling operations. The surfaces after installation are also soiled and spotted from handling and forming operations incident to installation.

The oil and dirt will eventually be washed off by rain and weathering, but if color is to be applied immediately after erection the surfaces must be cleaned.

### Cleaning Solutions

Prepared cleaners especially suitable for removing oil, grease and dirt from metal are available at hardware and paint stores and are preferred. However, the following solution and method can be used, but it must be handled with care so as not to injure the hands or clothing.

1. Prepare a strong potash lye solution in the ratio of one pound of lye to a pail of boiling water.
2. Apply this with a brush, *scrubbing thoroughly.*
3. The surface must be washed thoroughly with clear water to remove all cleaning compounds.

Thorough washing of the copper after cleaning is essential since any cleaning compound left on the surface will prevent proper chemical attack. Whether the surface is suitably cleaned from oil may be judged by the action of the droplets from the spray. The droplets on striking the surface should wet the surface and spread out. If droplets do not wet the surface, but tend to remain spherical and not spread out, the surface is not free from oil and should be cleaned further.

It has been found that relatively thick oxide films will cause poor adherence of the patina. This is particularly true on roofs that have weathered for about six months to a year, depending on location. Color will not develop satisfactorily on such roofs.

For such conditions it is necessary to remove the oxide film by washing with a 5% to 10% solution of sulphuric acid. The solution is applied cold. It is best done by swabbing with a cloth moistened with the acid solution, followed im-

**Artificial patina was applied to the copper roof of the addition to the Toledo, Ohio, museum to match natural patina on older portions of the building. Scaffolding of this type was employed. Fred Christen and Sons were the contractors.**

mediately by washing with clear water.

The acid must be handled with care. Rubber gloves should be worn. Care must also be taken not to let any acid come in contact with adjacent wood or stonework.

Treatment with sulphuric acid leaves the copper in excellent condition for coloring. It may be used to advantage on new as well as old roofs.

### Solution Materials

The following materials are required in the amounts and proportions given in the table to make up the amount of solution required to color the areas indicated.

The ammonium sulphate should be of "Technical Grade." Agricultural grade may be used but its use requires filtering of solution to remove contained dirt.

The copper sulphate is commonly known as blue vitriol.

The concentrated ammonia should have specific gravity of 0.90.

| Roofing Squares (100 Sq. Ft.) | Ammonium Sulphate (Pounds) | Copper Sulphate (Ounces) | Concentrated Ammonia (Fluid Ounces)* | Water (Gallons) | Total Solution (Gallons) |
|---|---|---|---|---|---|
| 10 | 6 | 3 | 1.34 | 6½ | 7¼ |
| 20 | 12 | 6 | 2.67 | 13 | 14½ |
| 30 | 19 | 9 | 4.0 | 19½ | 21¾ |
| 40 | 24 | 12 | 5.34 | 26 | 29 |
| 50 | 30 | 15 | 6.67 | 32½ | 36¼ |

*One fluid ounce concentrated ammonia=0.936

For the sake of simplicity it is recommended that the chemicals for a given job be purchased already weighed and measured to the proper quantities for 50-square batches in the number required, plus whatever smaller batch is needed. This will avoid the necessity of the contractor or owner having the proper scales and graduates on hand.

As an example, if there are 12,600 square feet of copper to be patinated, this is equivalent to 126 squares and the purchaser would buy the three chemicals each separately measured for making two 50-square batches and one 30-square batch. (The solution is so cheap that it is advisable to make up enough for the next highest multiple of 10 squares.) The table indicates that the following materials are needed:

*Ammonium Sulphate*—2 packages of 30 pounds each and 1 of 18 pounds.

*Copper Sulphate*—2 packages of 15 ounces each and 1 of 9 ounces.

*Concentrated Ammonia* (specific gravity 0.90)—2 bottles of 6.67 fluid ounces each and 1 of 4.0 fluid ounces.

The three batches would then be mixed separately, with the first two large ones requiring 32½ gallons of water and the last one requiring 19½ gallons of water. In all cases the preparation and mixing of the solution *must* be carried out *exactly* as described below.

### Preparation of Solution

*IMPORTANT. No iron or metal containers except lead should be used for preparing or storing solution. Wooden barrels or tubs are satisfactory.*

Dissolve the proper amount of ammonium sulphate in the water required. Solution should be complete.

Then add the correct weight of copper sulphate to the above solution of ammonium sulphate. This is best done by removing a few gallons of the above solution and dissolving in it as much of the copper sulphate as possible, returning this to the original volume. Repeat this procedure until all of the copper sulphate is dissolved.

Then add *slowly* with *constant stirring,* the required amount of concentrated ammonia to the above solution of ammonium sulphate and copper sulphate.

It is *especially important* that the ammonia be measured exactly. The correct ratio of ammonia to water *must* be maintained in preparing the solution.

The solution is now ready for use.

### Method of Application

The method of application described below must be used to obtain best results.

The solution is applied by spraying. An ordinary garden insecticide knapsack sprayer, the inside of which was coated with bituminous paint, proved very suitable. The spray must be applied rapidly in such a manner that after spraying the solution rests on the copper surface in tiny isolated drops. This can be readily accomplished with a little practice. It is better to apply too little than too much, since an excess will cause large drops to accumulate which will run down over the surface and cause streaks. After spraying the first time, the drops should be allowed to dry. On a warm sunny day this requires about ten to fifteen minutes; on cloudy days a longer time is obviously necessary.

This spraying and drying period is then repeated (in manner described) until five or six applications of the solution have been made.

*The color does not appear immediately.* Upon completion of spraying treatments the surface of the metal should be covered with a "glassy" coating, in appearance somewhat like a dark heavy coat of varnish.

*The development of color then depends upon suitable weather conditions.* Rain falling on the roof within six to eight hours may spoil the work, washing off the salt before it has had opportunity to act upon the copper. The ideal condition following application of spray is a moderate to heavy dew. A light mist or fog is equally satisfactory, or any similar condition of relatively high humidity. It must be above 80% relative humidity for chemical attack to occur. The salts deposited on the copper by the spraying are hygroscopic, that is, absorb moisture from the air, which promotes the chemical attack on the copper. To obtain satisfactory depth of coloring the attack should proceed for about six hours. Provided this period of attack has occurred, the next rain will wash off the excess salt and bring out the blue-green color of patina. The color that develops at first is somewhat bluer than the "natural" patina, but on weathering the color approaches the "natural" shade. The time required for this to occur depends upon climatic conditions.

### Color Effects

(a) If a dark copper or brown tone is desired on copper or alloys

(*Continued on page* 96)

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VOTE

# RESIDENTIAL AIR CONDITIONING SECTION

As this June issue goes into the mail, the cooling season is in full swing in most sections of the country. From all indications the season should be an active one if sales plans promulgated during the spring bring forth any fruit.

Eliminating those installations where a room unit is satisfactory—cooling should be very much a part of every sheet metal or air conditioning contractor's program. Whether or not the contractor sells and takes the profit from equipment; the fabrication of the metal work and its installation should provide increasing activity.

The problems of cooling are twofold. Systems must be designed. The cooling load must be calculated. A layout must be prepared to get cool air into and heated air out of spaces cooled. The same intelligence is required as exercised in a good heating system. The fabrication and installation of the metal work is familiar to every contractor.

Summer issues of American Artisan will deal with every phase of cooling.

WATERLOO

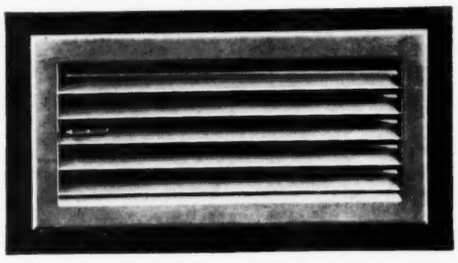
# Air Conditioning REGISTERS

## 1937's Most Completely Modern Registers

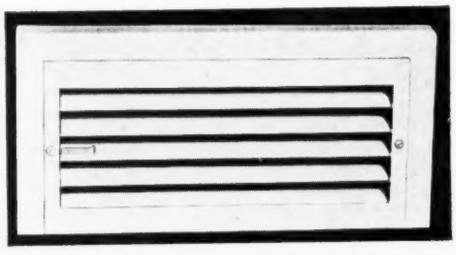
### . . . Really getting the business for Waterloo dealers

Here is the 1937 answer to builders' demands for a MODERN register to harmonize with today's new, modern homes and buildings. Distinctive straight-line simplicity and smart "Venetian blind effect" set Waterloo Air Conditioning Registers apart from all others—give Waterloo dealers a wide sales advantage over competition. The pictures on this page only begin to tell the story. In addition to smartness and beauty, these truly MODERN registers offer such exclusive, tested mechanical features as—

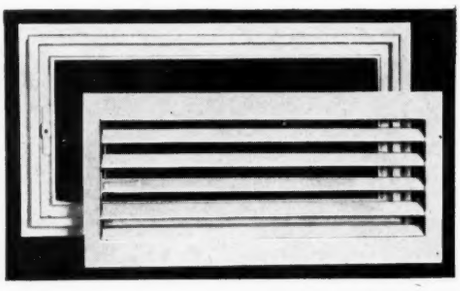
Slanted louvres which reflect light and color, conceal the ducts—Complete adjustable control of air flow (90-degree range) — Positive lock mechanism — Tested capacities.



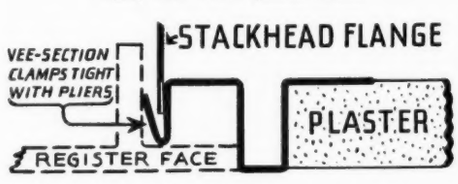
FH-100—Adjustable one-piece Venetian Type Register for walls.



FHD-204—Two-piece Venetian type adjustable register for baseboards.



FH-102—Venetian Type adjustable register for walls, with Vee-U plaster frame.




The Waterloo Vee-U Frame assures positive, tight connection with stack-head.

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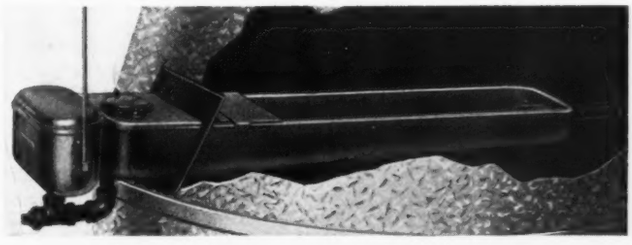

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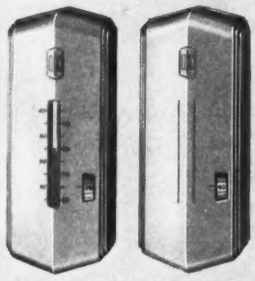
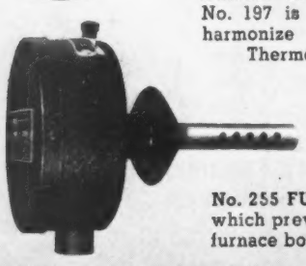
No. 431 DUCT DAMPER MOTOR - Bracket is available for either right or left hand mounting.

"GENUINE DETROIT" TWO-ELEVEN THERMOSTAT — the "brains" of the heating system, whether simple or zone controlled. The "Genuine Detroit" Humidistat No. 197 is styled to harmonize with the Thermostat.





No. 255 FURNACE LIMIT SWITCH, which prevents overheating in the furnace bonnet or plenum chamber.

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Residential buildings of the rambling type, those having critical exposures or definite divisions between living quarters, servants' quarters, etc., present a serious warm air heating problem.

It is often impossible to hold uniform temperature throughout the building with a single thermostat. One part will overheat before another gets warm, and, as wind direction is likely to vary the condition from day to day, no amount of balancing of ducts will cure the trouble.

This type of structure needs "Genuine Detroit" Zone Control. The building is divided into two or more zones with a thermostat controlling each. A main duct with branches leads to each zone. Each thermostat controls a damper in its duct. When a thermostat calls for heat in its zone, it opens the governing damper, which in turn operates the main heating unit. Dampers to zones not requiring heat remain closed, though the heating unit does not stop until all zones are satisfied.

As thermostats are independent, *different* temperatures may also be maintained in different zones, if desired. Also, if day and night thermostats are used, one or more zones may be changed to day or night temperature independently of the others.

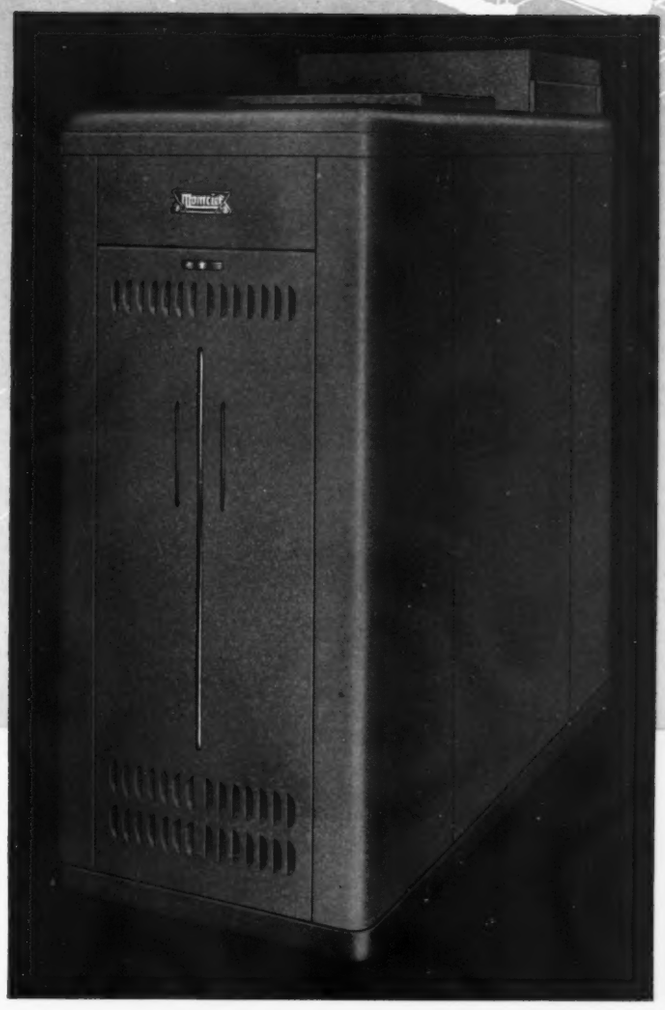
Each zone damper is actuated by a "Genuine Detroit" No. 431 Motor Unit. This is entirely noiseless, so is regularly mounted on the duct without danger of objectionable noise being telegraphed along the duct to rooms above. A No. 255 Furnace Limit Switch prevents overheating in the plenum chamber to which zone ducts connect.

Write for Bulletin 66 on the "Genuine Detroit" Zone Control. It is a thoroughly sound answer to the problem of heating many types of houses satisfactorily with warm air.

# MONCRIEF SPECIAL

## Oil Fire

## AIR CONDITIONER



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Send for descriptive literature of Moncrief Air Conditioners for gas, coal, or oil.

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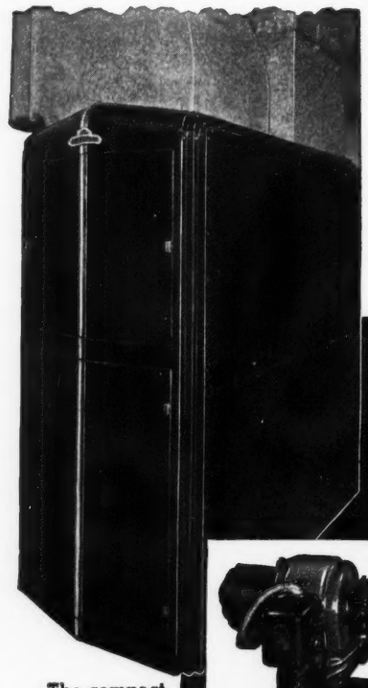
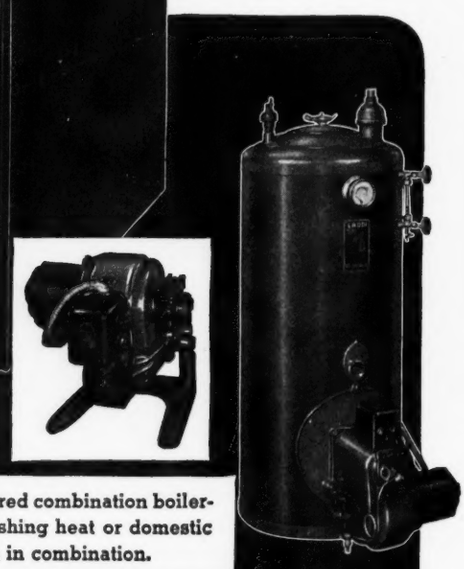


Selectair—a split system air conditioning unit—oil fired by the Johnson Pressure Type "Bankheat" Burner.

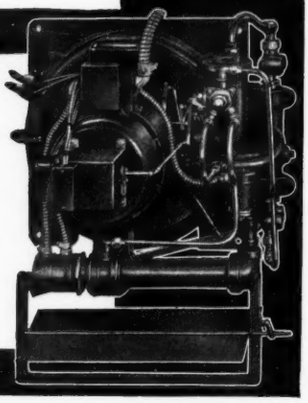




The compact "Bankheat" Burner

"Laddi"—an oil fired combination boiler-burner unit furnishing heat or domestic hot water or both in combination.

Manual or Semi-Automatic Heavy Duty Rotary Industrial Oil Burner Type No. 28. This burner and the fully automatic burners can be equipped with special fire hole plate for burning either gas or oil.



Heavy Duty Rotary Type Fully Automatic Burner 30AVH equipped with Johnson viscosity control valve Low Fire Starting and Modulated Firing and oil preheater, making possible the efficient and economical use of No. 6 fuel oil.

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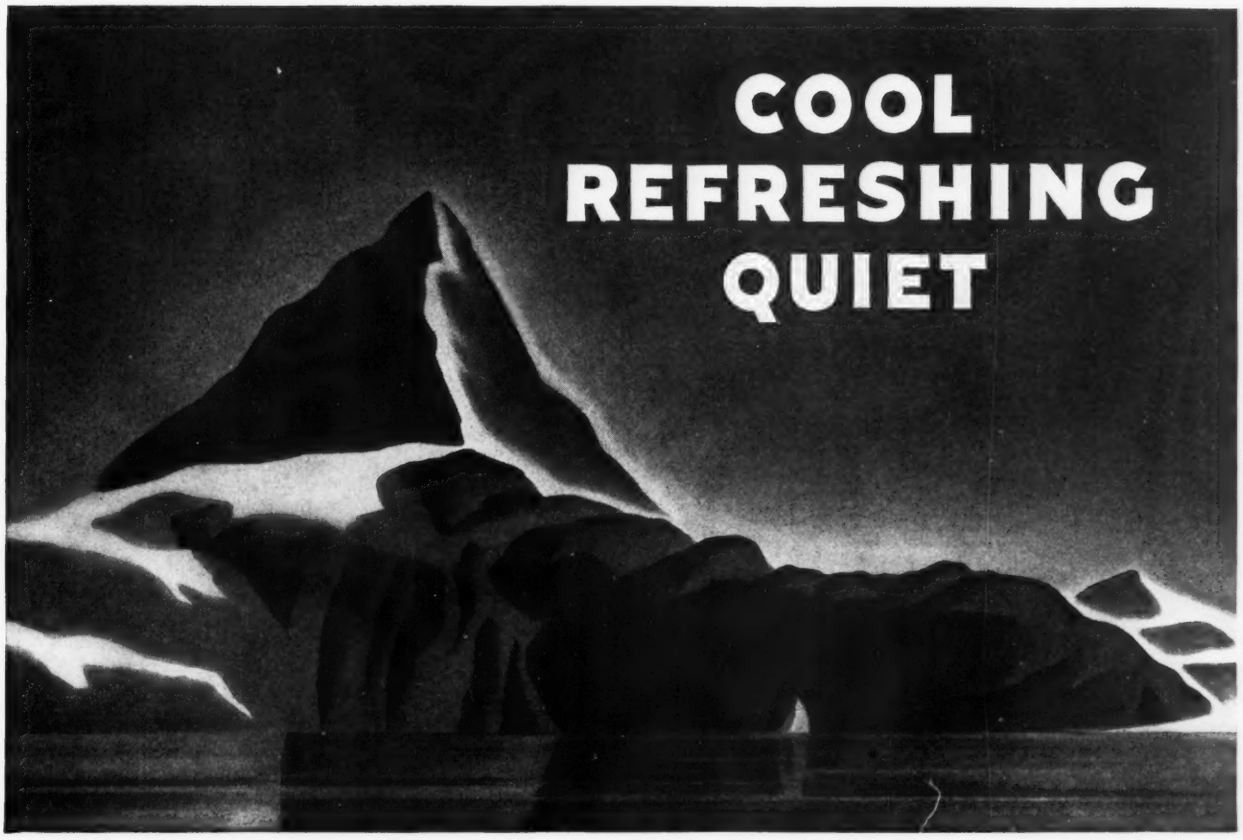


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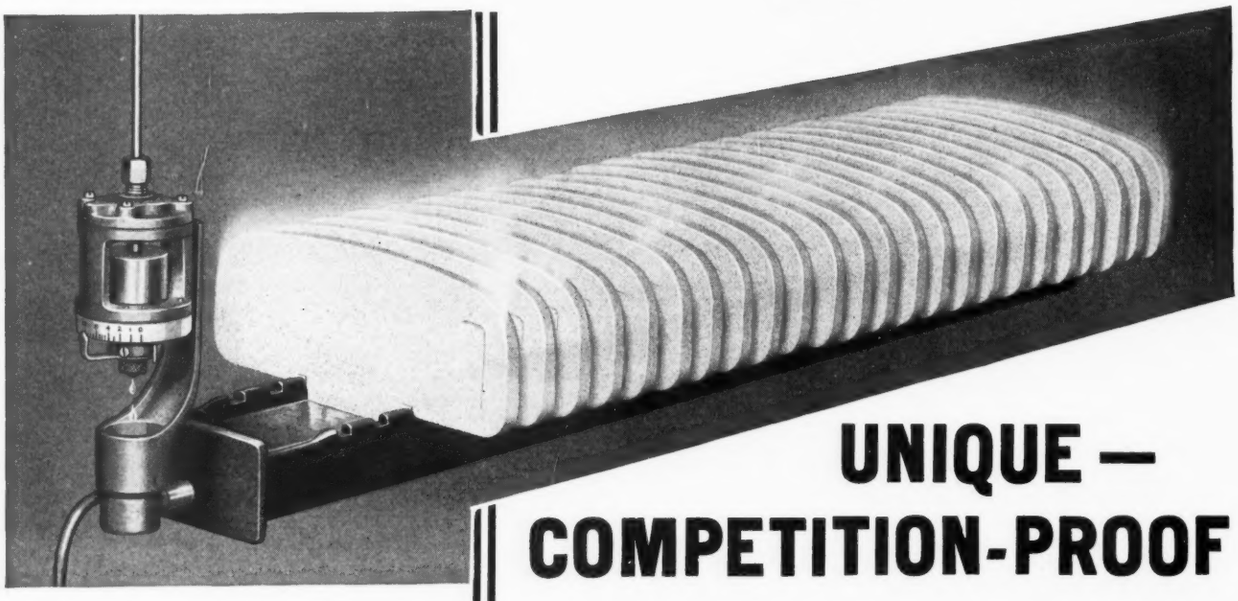
**Century**

**PIONEER MOTORS FOR AIR CONDITIONING**

# AUTOMATIC JUNE

## Hydro-Metric Humidifying Systems



## UNIQUE — COMPETITION-PROOF

### BASEMENT CONTROL UNIT

This newer model, illustrated above, is a complete, self-contained unit. The humidity control device is mounted on the end of the evaporator projecting outside the casing. This model is popular priced but includes every element which makes Automatic June the perfected humidifying system.

### ROOM CONTROL UNIT

Includes a handsome bakelite control instrument, the "Humitor" which mounted in any living room, gives added convenience. The home owner can see the water dripping on its way to the evaporator. Dial shows rate of evaporation per day in gallons. The ultimate in convenience and efficiency.

### SEND FOR FREE BOOK

"The Science of Re-Humidifying Indoor Air" gives a graphic picture of the humidity problem and tells how to solve it. Send for your copy, together with details of the Automatic June Proposition.

MONMOUTH PRODUCTS CO.
231 E. 131st St., Cleveland, Ohio

Please send me "The Science of Re-Humidifying Indoor Air" with descriptive literature, prices, etc., of Automatic June systems.

Name .....
Business .....
Street .....
City ..... State.....

You enjoy a great and unusual advantage when you sell Automatic June.

For it places you completely outside the range of competition—price or any other. It gives you unique features to talk about—features that heating engineers have been looking for, and which home owners readily understand.

Only Automatic June graduates indoor humidity in accordance with outside weather conditions,

—Providing ample humidity in mild weather or with forced air circulation.

—Avoiding weeping windows in severely cold weather.

Only Automatic June affords so great a humidifying surface with so small horizontal area.

Automatic June is a complete humidifying *system*—tried, proved, reliable. It fits the bonnet of any warm air furnace or air conditioner. Is trouble proof, can not become lime clogged. Comes in two types—Room Control and Basement Control. Reasonably priced.

Jobbers—Dealers: Send for details of the profit-building Automatic June Proposition.

## MONMOUTH PRODUCTS CO.

**231 East 131st Street** **Cleveland, Ohio**

# THE *Pacific* STREAMLINE DE LUXE

## A NEW FORCED AIR UNIT THAT CLEARLY DEMONSTRATES PACIFIC LEADERSHIP IN THE QUALITY FIELD

★ Here, in this newest and finest addition to the Pacific line of gas heating equipment, is a source of more profits and a growing list of satisfied customers.

With the Pacific Streamline De Luxe Blower Furnace you meet every demand for forced-air heating and ventilating—complete, automatic, trouble-free. You offer a unit whose beauty of exterior is matched by the traditional excellence of Pacific design and materials.

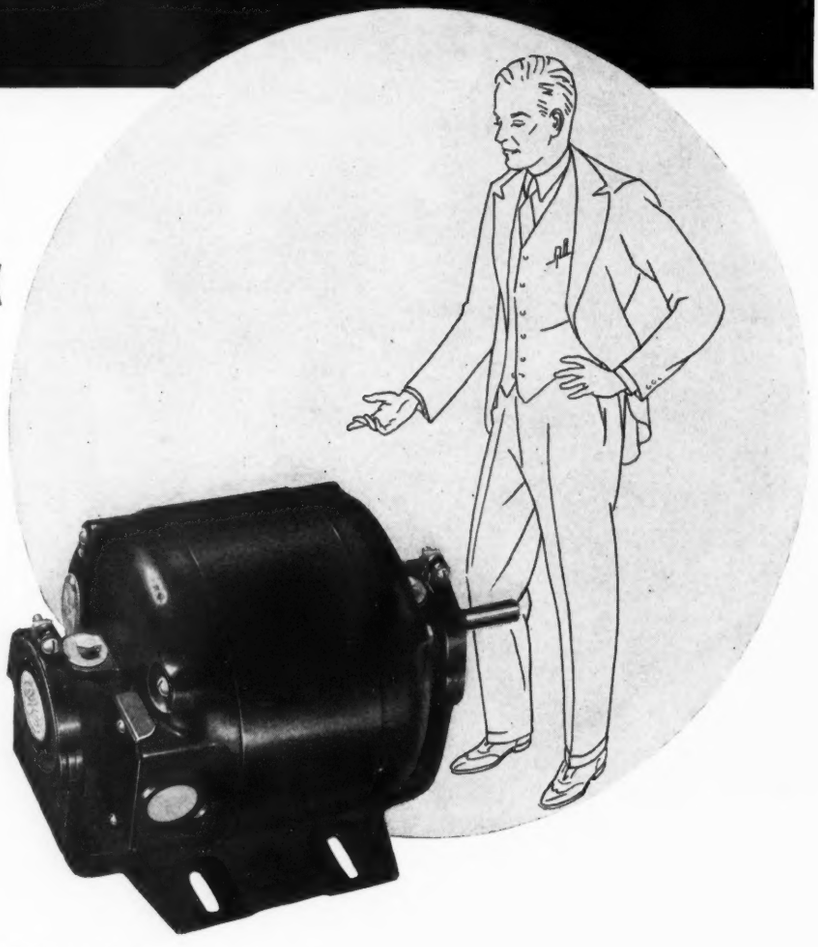
The streamlined casing of this unit is furnished in a choice of several attractive colors which will harmonize with decorative schemes where basements are used as recreation rooms. Gleaming chromium trim sets off sides and corners. All controls are completely enclosed for added safety.

Write at once for new sales literature now in preparation. Take our word for it that the new Pacific Streamline De Luxe Blower Furnace will outperform and outsell any other gas-fired unit in the quality field. Ask for Catalog AAJ.

**PACIFIC GAS RADIATOR COMPANY**

1740 WEST WASHINGTON BLVD., LOS ANGELES, CALIFORNIA

# FREE AN EXTRA SALESMAN WITH EVERY MOTOR



WOULD you like to add to your sales force — *right now,* when building is becoming very active—without adding one cent to your payroll?

When the air-conditioning and warm-air heating equipment you sell is equipped with G-E motors, you get these extra salesman to *help you sell.*

How do they help you sell? In this way: Homeowners prefer high-quality equipment. They judge the quality of a device not only by its reputation as a unit, but also by the reputation of its various parts. Thus, a well-known name on the motor gives the air-conditioning and warm-air heating equipment you sell additional acceptance — it is the extra salesman that helps you sell.

The reputation of G-E motors, added to the other favorable features of the equipment you sell, goes a long way toward changing prospects into customers. Appliance dealers know that G-E motors are a definite sales aid. Note what they say about it, below. General Electric, Schenectady, New York.

## 84 PER CENT SAID "GENERAL ELECTRIC"

In a recent impartial survey, electric-appliance dealers and department stores were asked:

**"What makes—or brands—of motors, in your opinion, would make it easier for you to sell appliances?"**

General Electric was named by 84 per cent.

## ADDITIONAL POINTS THAT HELP YOU SELL

**Indestructible Rotor—**

Cannot become open circuited or burn out: one-piece casting — no welded or soldered joints.

**Protected Windings—**

Resistant to oil, moisture, heat, and mild acids and alkalis; thoroughly bonded to withstand vibration.

**Quietness—**

That comes from resilient-rubber mounting, end-play silencers, and a carefully balanced design.

**Improved Lubrication—**

Wool-packed bearings. Extra-large oil capacity—oiling is required but once a year.

070-200

# GENERAL ELECTRIC

# AIR-CONDITIONED HEATING... by RYBOLT

**HERE are two new, up-to-the-minute Rybolt Winter Air Conditioning Units—the finest and most attractive Rybolt has ever introduced. One style has the latest model steel heating element and is pictured on the left; the other, with cast iron heating unit, is shown at the bottom.**

The Series 600A7 Rybolt Winter Air Conditioning Unit is illustrated at the left. This unit has as its heating element the new 600 Series Steel Rybolt furnace.

Every advantage associated with up-to-date warm air furnaces of the steel type, such as quick response to firing, ease of cleaning, and gas-tight construction, will be found at its best in the Rybolt 600.

Its scientific design, combined with high quality materials and skillful workmanship, assure efficient, economical operation, long furnace life, and low maintenance cost.

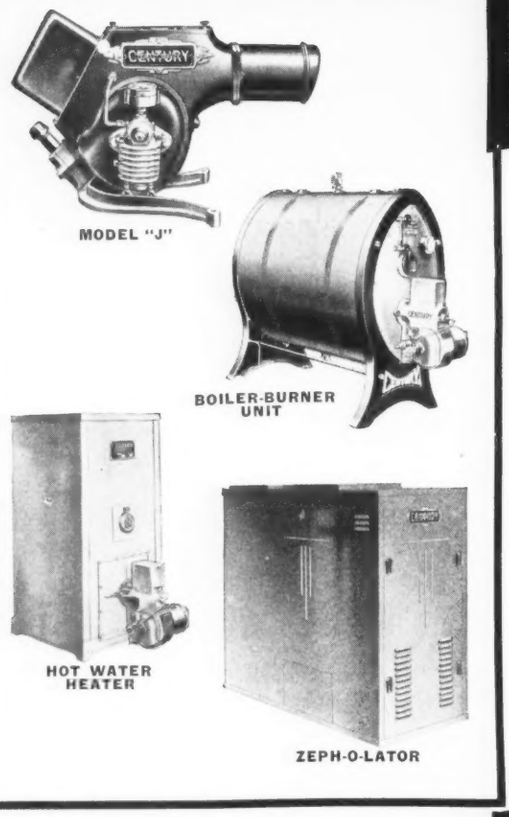
Pictured here is the Series 157 Rybolt Winter Air Conditioning Unit, which has as its heating element the well-known Series 15 Rybolt Cast Iron furnace.

This furnace is the result of many years of continuous engineering experience and development; it combines with time-tested Rybolt features all of the modern features of warm air furnaces of the cast iron type.

Salient points include slip-on fronts, surface ground ashpit and feed door joints, one-piece radiator, and Rybolt duplex ball bearing grate. All are important factors of efficient, economical, and clean operation.

Your customer is in for years of care-free heating comfort—you're in for season after season of extra profit when you specify and install either of these crack winter air conditioning plants. Write now for a new catalog.

## THE RYBOLT HEATER CO. ASHLAND, O.




There are dozens of exciting new features offered by each Century Model in the 1937 complete line. Take the new Century fuel unit assembly. Into one compact, interchangeable unit, it combines pump, strainer, and duplex combination shut-off and pressure regulating valve. It gives better lubrication and longer wear to moving parts, eliminates pump chatter and tank hum.

We might talk more about Floating Flame, too, and Even-Flo combustion. The matched and balanced construction of Century's complete heating Units . . . Zeph-O-Lator for warm air conditioned heating, and the Century Boiler-Burner Unit for hot water, steam, or vapor heating installations. The new Century Hot Water Heater with its extra big capacity, and the Century Model J . . . one of America's fastest selling conversion burners.

But nothing we could say is more convincing than this. Century sales are the greatest in history. So let your sales hum, too. Get in the money with the complete line of Century products. Write today for full details and specifications of each model . . . and the nationwide Century advertising drive. The CENTURY ENGINEERING CORP., Cedar Rapids, Iowa.

**Look!** Impartial field tests, made by an outstanding oil company prove Century Warm Air Conditioning Furnace Units give an actual fuel recovery in excess of 85 per cent!

# CENTURY

Conversion Burners . . Boiler-Burner Units . . Warm Air Furnace Units with Air Conditioning . . Hot Water Heaters

# Calculation of the Refrigerating Load*

By H. J. Macintire

Professor of Refrigeration
University of Illinois

THE refrigerating engineer has been using for a quarter of a century the terms "manufactured weather" and "let every day be a good day" as applied to air conditioning in industry. The more recent application of refrigeration to comfort cooling in the home or in the office has modified the details, but has in no way altered the objective of the work. We manufacture a definite set of conditions involving temperature, humidity, and intensity of air motion, we control the direction of the air movement, the amount of dust the air contains, the maintenance of the air below a detectable concentration of odor, vapor, and smoke, and we even eliminate sound vibrations beyond a certain intensity level. We try to make the conditions of rest or work comfortable and every day a good day.

In the early days of comfort cooling, the popular advertisement was "30 deg. F. cooler inside," or later we attempted to secure conditions of 57 deg. F. dewpoint temperature. Both of these objectives were ill advised, as 30 deg. F. colder inside was not comfortable and attempts to secure 57 deg. dewpoint temperature led to chaos. At the present time we feel that any effective temperature from 70 or 71 to 74 or 75 deg. F. will be comfortable to the average person within a short time after exposure.

However, the securing of comfortable conditions involves the lowering of the temperature within the enclosure and a reduction of the moisture content of the air. This requires the use of a machine, usually, which has the ability to reduce the air temperature to a dewpoint temperature sufficiently low so that the proper water vapor content of the air may be secured, and which has the required cooling capacity to not only condense out the surplus water vapor, but to absorb the sensible heat entering the office or residence.

*Paper presented before the Conference on Air Conditioning by the University of Illinois Engineering Experiment Station, Urbana, June, 1936.

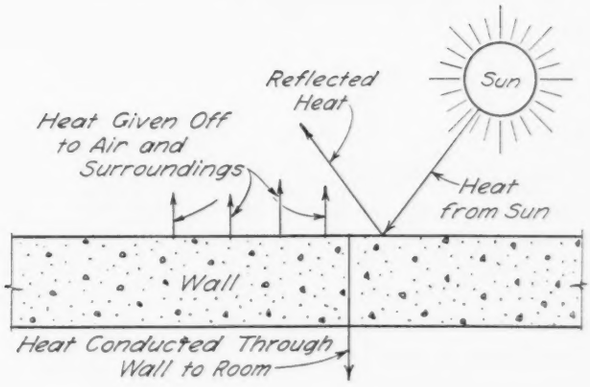



**Fig. 1. Heat Flow Through Wall of Residence.**

## Factors Involved in Comfort Cooling

In comfort cooling, the sources of sensible and latent heat loads on the refrigerating equipment are as follows:

(a) The sensible heat *conducted* through the walls, windows, ceiling and roof.

(b) The *radiant* heat from the sun entering through the walls, roof and windows.

(c) The sensible and latent heat brought into the building by uncontrolled *infiltration* or on account of controlled fresh air.

(d) The sensible and latent heat liberated by the *people present.*

(e) The *heat generated* by various machines, and appliances, such as electric lights, machines, and heating appliances.

## Conduction

If the temperatures inside and outside the home or office are $t_i$ and $t_o$, respectively, the amount of heat leakage, $Q_c$, in B.t.u. per hour may be found by the expression:

$Q_c = A_w U_w (t_o t_i)$ B.t.u. pr hr.,

where $A_w$ is the area of the wall, window, ceiling, or partition, and $U_w$ is the overall coefficient of heat transfer in B.t.u. per sq. ft. per deg. F. per hr.

The outside-air design temperature should be selected so that the maximum temperature over a period of years will be included during about 90 per cent of the cooling season. The space above the ceiling may be excessively hot, being as much as 120 to 130 deg. F. in the latitude of Urbana, Illinois.

## Solar Radiation

Solar radiation has to be handled differently from conduction. The maximum intensity of the sun varies with the latitude and the time of day, and in Urbana it may be as much as 210 for vertical walls, 280 for horizontal roofs, and 190 for vertical windows. The amount of heat ($Q_r$) absorbed by a roof or wall and transmitted to the interior may

(*Continued on page 62*)

# —CLOSE— isn't CLOSED!

By R. Louis Towne

COMING close to that signed order without getting it is just as bad as missing it a mile and even worse for the old moral. For, "almost had 'em"—"I'll sure sell 'em next week"—"I'll get that order in a day or two"—do not count when it comes to balancing the sales report at the end of the month. About the only place "close" counts for anything at all is in horse shoes. The game and stakes for which we are playing in the business of selling automatic heating are much bigger.

Let's get right down to cases then, and analyze some of the closing action of the cream of automatic heating salesmen. They must have something special on the ball, for month after month their records show them to be away out in front in contacts made and in orders closed. It is true that there are born "closers"; fellows who seem instinctively to grasp the psychological moment and bend it to their will. But the study of the tactics of hundreds of salesmen proves conclusively that on the whole there is nothing mystical about closing methods; not one thing that cannot be learned by any reasonably successful salesman who will take the time and make the effort to learn.

To set up a rough rule as a guide, let us say that the secret of closing the sale is knowing when to ask for the order. There is always one place in the presentation where the prospect is most convinced —most sold-on the product you are offering for sale. It stands to reason that asking for the order at that point is a big advantage. Missing that moment does not necessarily lose the order, but it sets up an additional hurdle for you to get over.

### Lead to a Definite Commitment

How many times have you made a bang-up presentation only to have the prospect say "no" in such a manner that you have been at a loss as to how to proceed further? As a result you probably picked up your sales kit and left, determined that he couldn't be sold or that you would get him later. Suppose instead, you had tried to draw from the prospect the one thing upon which he was not sold. Suppose you had stayed with him, reviewing your presentation in question form, until you found which points you had negelected. That is what is known as sticking with the prospect until every possible sales approach has been covered. As an example let's look in on a successful salesman at work.

Our scene is in the living room of the Bromley's home. Our salesman has covered all of the features of his equipment and told the story of comfort, convenience, health and leisure that automatic heating equipment gives. But Mr. Bromley says:

"What you say is interesting, but I've just put in eight tons of coal."

And then our salesman makes a fatal mistake. He says;

"Oh don't worry about that coal, Mr. Bromley, I'll help you sell it and give you credit for every pound of it."

As fair as this offer is, it isn't enough for Mr.

◆

**Talk advantages and conveniences while filling out the order. By talking positive advantages, you do not permit negative resistances to form in the prospect's mind.**

◆

**If you have already filled in the order blank, sign your name and hand the order to the prospect, explaining it itemizes the equipment selected. Ask the prospect to check the items and sign.**

Bromley. He decides to think it over awhile and the order is lost. Now, just suppose that the salesman hadn't paid any attention to Mr. Bromley's remark and had gone right on with his story or rather the summation of it. The conversation might have been something like this:

"But Mr. Bromley you will admit that fully automatic heat will add greatly to your comfort and enjoyment in your home."

"Why—yes—"

"And you can see the many advantages to Mrs. Bromley because your home will be cleaner, of more even temperature, free from draughts and free from furnace worry?"

"Certainly."

"Well, then, Mr. Bromley, you can begin having those many advantages right away. You owe it to yourself. Don't worry about that coal. It can be disposed of easily and you'll begin to have real enjoyment in your home immediately."

In this latter procedure we can see that the salesman made the prospect commit himself definitely to the advantages of automatic heat. The riddance of the coal would have been a secondary, not a primary, consideration. These same closing tactics can be used no matter what the objection and they work because people instinctively try to carry out the ideas they definitely express.

Right here though, is a good place to discuss for a moment "curbstone analysis". Suppose that the prospect you are working on does not sign. After you leave him, you should immediately go back over the interview, step by step, and try to find the one place that was the selling flaw. Thinking over your presentation carefully will enable you to improve your selling technique and prevent you from making the same mistake when a similar situation arises.

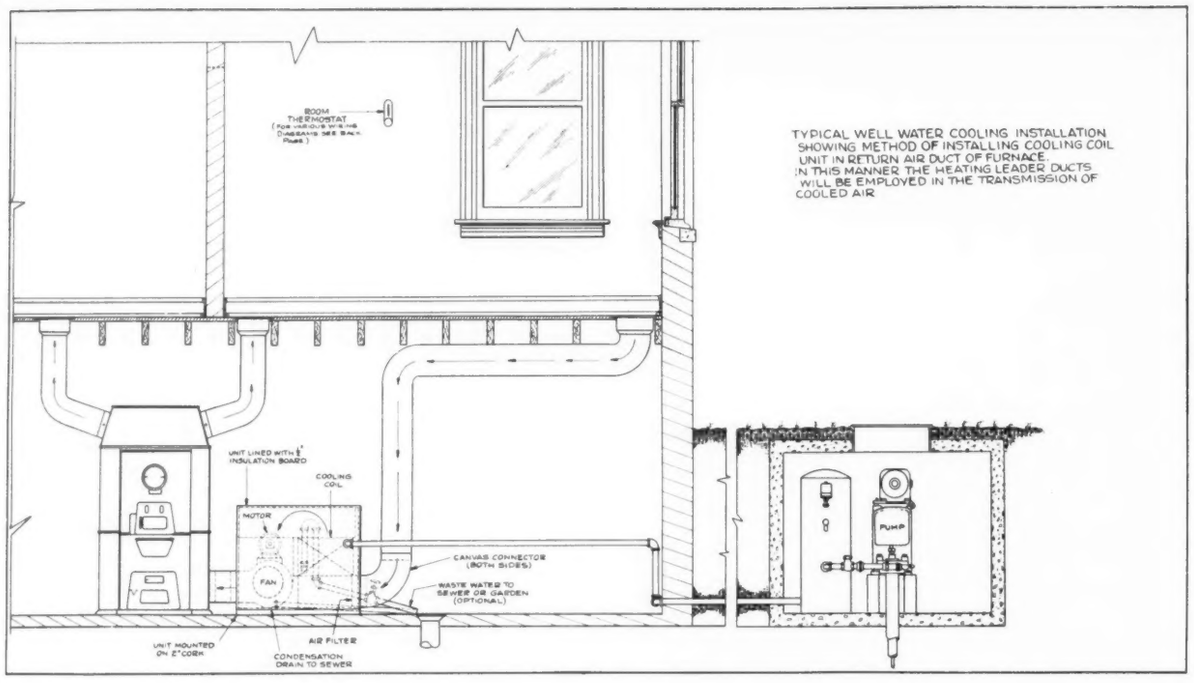
### Old Man Trouble—The Order Blank

"Everything is fine until I pull out my order book". If we had a nickle for every time that statement was made we'd be living off the fat of the land. As a matter of fact, the order blank can be made a definite asset to the closing action. It's all in the mental attitude and in the manner with which it is presented. There are two major methods in which to present your order. Either bring it out at the proper moment and talk positives as you

(*Continued on page* 78)

◆

**From top to bottom: 1—Call your order an agreement and ask the prospect to witness the proposal. 2—Don't be afraid to ask for a quick decision. Decision is typical of big men and flatters your prospect. Mention quick decisions of nearby buyers, if you can. 3—When the prospect says "no," or "give me time to think it over," don't quit. Start listing the advantages all over again and lead up to the order. 4—Sometimes packing up the kit as if to leave makes prospects drop their guards. This is a good time to introduce furnace cleaning or any other small service which leads into renewed sales talk.**




TYPICAL WELL WATER COOLING INSTALLATION SHOWING METHOD OF INSTALLING COOLING COIL UNIT IN RETURN AIR DUCT OF FURNACE. IN THIS MANNER THE HEATING LEADER DUCTS WILL BE EMPLOYED IN THE TRANSMISSION OF COOLED AIR

# Summer Air Conditioning With Well Water*

AIR Conditioning may be defined as the process by which the temperature, moisture content, movement and cleanliness of the air in spaces intended for human occupancy, are maintained within desirable limits. Air Conditioning equipment may perform these functions in winter only, in summer only, or during all season of the year.

If a piece of equipment does not perform all four functions mentioned in the definition of air conditioning it should be called by a name which describes only the function performed. For instance neither a temperature controlling instrument nor an air moving apparatus should be called air conditioning equipment.

### Methods of Summer Air Conditioning

Cooling for comfort has made rapid strides in the past few years and has finally reached a point where it is a very important part of the heating and ventilating industry. Various methods are being used to accomplish Summer Air Conditioning. Ice has been used very satisfactorily in a number of cooling installations. Refrigerating machines using Freon, Methyl Chloride and other common refrigerants are frequently used. Another type of Summer Air Conditioning system uses a chemical process for removing moisture from the air which in conjunction with a small amount of cooling makes a very satisfactory installation, though as yet this type of system is not very common. Last, but not least is the type of system using well water as the cooling medium.

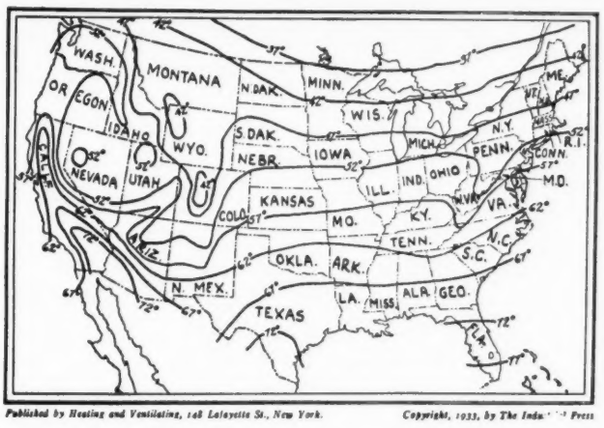
There are many parts of the country where well water can be obtained with temperatures from 48° F. to 60° F. which used with the proper size fin type cooling coils will give excellent results both from the cooling and the dehumidifying standpoints. The use of spray nozzles for cooling should be discouraged because under certain weather conditions, no dehumidifying will be done and under those conditions the spray nozzles actually add moisture to the air.

Summer air conditioning can be, and frequently is directly connected with heating distribution systems. It is quite possible and practical to use the same well water for humidifying during winter heating season, as is used for cooling during the summer cooling season. However, the material contained herein concerns primarily summer air conditioning equipment.

### Conditions Pertaining to Human Comfort

A room temperature of 74° Dry Bulb, 70% Relative Humidity, is just as comfortable as a room temperature of 80° Dry Bulb, 50% Relative Humidity. A final air temperature leaving the coil 3° lower than the dew point temperature of the room air usually gives excellent results in the average residence or small restaurant. Therefore to main-

*Reprint of a booklet by the same name prepared by the National Domestic and Farm Pumping Equipment and Allied Products Manufacturers.




Published by Heating and Ventilating, 148 Lafayette St., New York. Copyright, 1933, by The Industrial Press

**Map of the United States showing average well water temperatures during summer season.**

tain a room temperature of 80° Dry Bulb, 60° Dew Point, 50% Relative Humidity, a final air temperature off the coils of 57° must be obtained. It will take 52° water to give this result but if only 55° water is available which will give a 60° final air temperature, then figure on maintaining a room temperature of approximately 80° Dry Bulb, 63° Dew Point, and 57% Relative Humidity, which is very comfortable.

### Operating Controls

In making a cooling installation the controls play a very important part. It is advisable to keep the fan running continuously regulating the room temperature by controlling the flow of water. If both fan and water are shut off at the same time, the results are not so good as the air motion imparted by the fan gives a sense of coolness which is lost when the fan is stopped. Many times it is found that the fan operating alone gives all the cooling required for quite a period before the temperature rises to a point where the water is required.

Even though the well water system is very flexible, as many different and satisfactory results can be obtained by varying the flow of air and water, do not figure installations too closely. Always install equipment of sufficient size to do the work required, as many factors enter into the operation of a cooling system which cannot always be estimated correctly and also many times the SPECIFIED conditions are changed and a little excess capacity is absolutely required to make the system function properly.

### Comparative Costs

The cost of installation and operation are important factors in selecting a cooling system. The following table gives a fair average comparison between ice water, compressor and well water installations, using a five ton plant operating for 600 hours as the basis of comparison and assuming in each case that the duct work is essentially the same and each system the same size fan driven by a ⅓ HP motor. This size of installation is approximately what would be required for an 8 or 10 room house. Comparative costs are for cooling equipment only as the cost of duct work, fan motor, controls, etc., are essentially the same in all three systems.

Where well water is available it is by far the most economical installation to install and operate. Even in California, Arizona, New Mexico and Utah where evaporative cooling can be used satisfactorily, well water installations have been made to operate satisfactorily. The cost of the well and pump is in many cases less than the cost of the cooling power required for evaporative cooling.

### Definition of Terms

Before going into the design of this equipment we must understand some of the terms commonly used.

**B.T.U.** = Quantity of heat required to raise 1 pound of water 1° F. or approximately the amount of heat required to raise 55 cu. ft. of air 1° F.)

(*Continued on page* 84)

| | INSTALLATION COST | | OPERATING COST 600 HOURS OF OPERATION | |
|---|---|---|---|---|
| Ice Water Installation | Ice Bunker<br>Circulating Pump<br>Cooling Coils | $ 600.00 | 25 × 5 = 125 tons ice.<br>125 T @ $3.50 | $438.00 |
| | | | ⅓ HP Motor on Fan<br>⅓ HP Motor on Pump<br>.5 KW × 600 × $.03 | 9.00 |
| | | | TOTAL | $447.00 |
| Compressor Installation | 5 Ton Compressor with 5 HP Motor Evaporator Coil | $1,050.00 | 5 HP on Compressor<br>⅓ HP on Fan<br>5 KW × 600 × $.03 | $ 90.00 |
| | | | Cooling Water 9 GPM<br>9 × 60 × 600 @ $.15 M | 48.60 |
| | | | TOTAL | $138.60 |
| Well Water Installation | Drilling Well Pump Installed with 1 HP Motor Cooling Coils | $ 750.00 | 1 HP on Pump<br>½ HP on Fan<br>1⅓ KW × 600 @ $.03 | $ 24.00 |
| | | | TOTAL | $ 24.00 |

# Forced Air Heating Facts From the Research Residence

By S. Konzo
Special Research Associate
Engineering Experiment Station
University of Illinois

## Night Air Cooling

**This discussion on night air cooling is based largely on the material published in the Engineering Experiment Station Bulletin No. 290 which is a report of the tests made in the Warm Air Research Residence of the National Warm Air Heating and Air Conditioning Association.**

THREE years ago in the American Artisan magazine, the writer explained the possibilities and limitations of night air cooling. The tests on this method of cooling were conducted in the Research Residence in the summer of 1933 and in subsequent summers. The results have been given wide publicity since then so that it is no longer necessary to give more than a brief explanation of some of the factors governing the process. However, in view of the rapid increase in number and types of installations, it is felt that the subject matter can be repeated to advantage. It is the purpose of this article to present a complete description of the tests conducted in the Research Residence.

On account of the expense involved in the installation of complete cooling equipment which will produce the desired indoor conditions at all times, these machines have been confined to a relatively small number of residences. There exists, however, a means of cooling that will aid materially in making living conditions more bearable in the summer for the vast majority of house-owners. This method of cooling is not summer air-conditioning in the strict sense of the term. It is a method for alleviating discomfort; it is a method of making conditions a little more bearable; it is a step in the right direction. Night air cooling is in fact nothing more nor less than a process which utilizes available natural resources, and is probably the easiest method for reducing the discomforts experienced during the summer.

### Typical Temperature Changes

The outdoor air temperatures during the summer days are never constant, but are always changing from hour to hour, as is indicated by Fig. 1. In practically all homes and structures exposed to summer conditions the outdoor air temperature will become lower than the indoor air temperature some time during evening hours, and will remain below the indoor temperature all during the night. During this interval the house will be slowly cooling off, but on account of the heat storage capacity of the large mass of the house structure, this cooling process will not be rapid. The rapidity of the cooling of the internal house structure will depend upon the amount of outdoor air that is circulated through the house.

The primary purpose of night air cooling, then, is to introduce air in such quantities into the house during the night hours, that the house structure will be cooled down as much as possible during the night; so that the house can be closed up in the morning and the coolness in the house can be conserved for the following day.

In Fig. 1 is shown a typical temperature cycle for outdoor air and indoor air for a medium, warm summer day. The following items are of particular interest:

1. The maximum outdoor air temperature usually occurs at approximately 3 p. m.
2. The minimum outdoor air temperature occurs at approximately 4 a. m. and is always approxi-

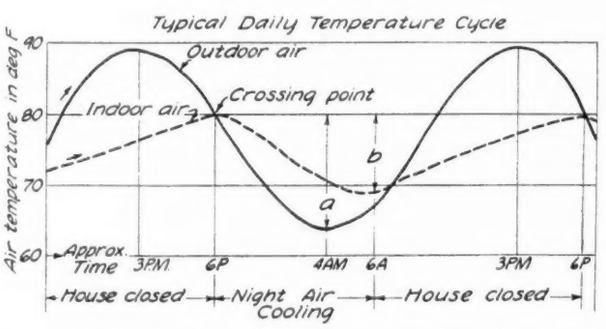



**Fig. 1—Chart showing a typical summer day temperature cycle and relationship between outdoor and indoor temperature fluctuations.**

mately 20 deg. F. lower than the preceding maximum temperature.

3. The maximum indoor air temperature will occur several hours after the outdoor air temperature has attained its maximum value. Ordinarily, the indoor air temperature will reach a maximum value between the hours of 7 to 9 p. m.

4. In the ordinary house the outdoor air temperature will usually be less than the indoor air temperature after 6 or 7 p. m.

5. The extent to which the indoor air temperature can be reduced during the night will depend on the amount of outdoor air introduced into the house and the extent to which the outdoor temperature drops during the night.

6. The maximum amount of night air cooling possible is that in which the indoor air temperature is reduced to the same value as the minimum outdoor air temperature. This amount has been considered as 100 per cent effectiveness in night air cooling, and is attained when drop *b* in Fig. 1 is made equal to drop *a*.

7. The minimum indoor air temperature will usually occur at 6 or 7 a. m.

8. The indoor air temperature will show a steady rise for approximately 12 to 15 hours following the time at which the indoor air temperature is at a minimum value.

9. The extent of the rise in indoor air temperature will depend upon:

a. The construction of the house.

b. The amount of ventilation of outdoor air during the day.

c. The extent to which the outdoor air temperature rises during the day.

d. The amount of heat liberated in the house during the day.

### Cooling Procedure

From this discussion the following procedure has been recommended:

*Start*—When the outdoor air temperature has fallen during the evening hours to the same value as the indoor air temperature, large quantities of outdoor air should be introduced into the house. Ordinarily this would mean that the ventilation process should start at about 6 p. m. and should continue until about 7 a. m. the following morning.

*Stop*—The windows should be closed and the outdoor air ventilation should be stopped at about 7 a. m. The "coolness" that has been stored in the house should be conserved until the evening hours, when the outdoor air should again be introduced into the house.

### Description of Plants

The circulation of outdoor air through the Research Residence "was accomplished either by opening the windows and relying on natural ventilation unaided by the use of a fan, by opening the windows and making use of the fan in the forced-air system, or by opening the windows and making use of a special fan installed in the attic. The first arrangement will hereafter be designated as natural ventilation, the second as the basement fan, and the third as the attic fan.

"The arrangement of the forced-air heating plant making use of the basement fan is shown in Fig. 2. When used for circulating air from the outdoors at night, all of the return air ducts were blocked so that the fan could not take any air from the rooms. For a few tests the outdoor air was taken into the fan through a connection from the nearest window. For later tests this connection was removed, and the fan was allowed to take air directly from the basement through an opening in the duct on the suction side of the fan. When this was done the basement door was opened to permit the entrance of air from outdoors. The fan delivered from

(*Continued on page 66*)

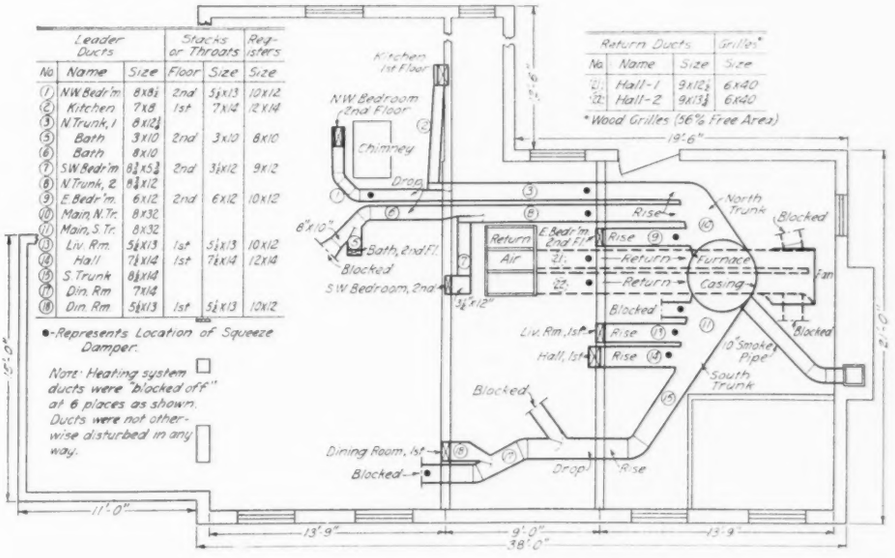
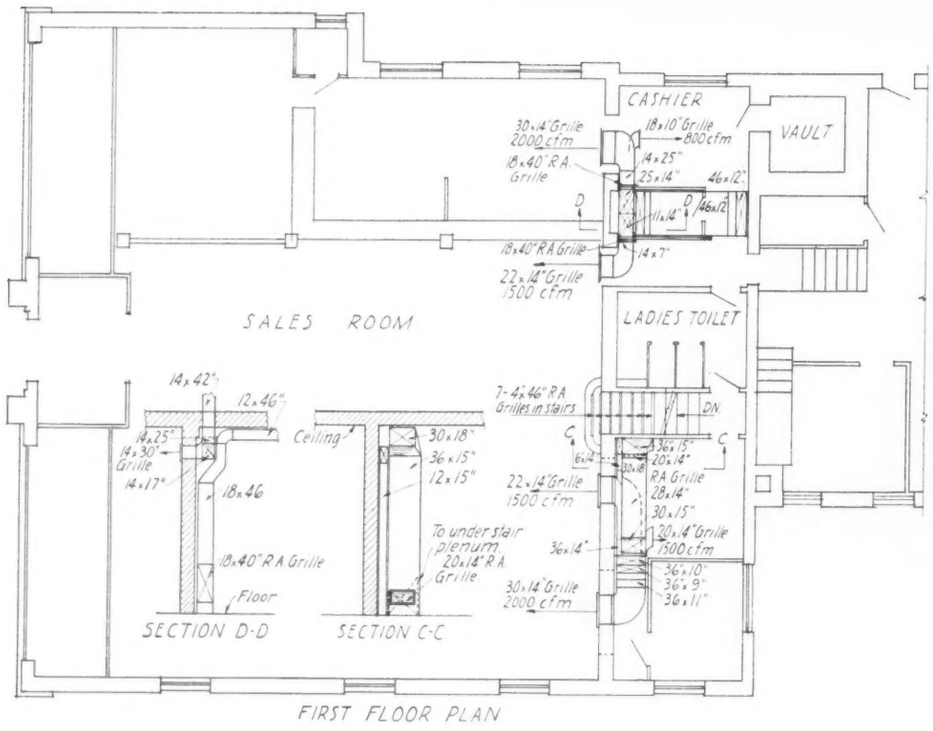



**Fig. 2—Basement plan of Research Residence showing duct system for distribution of cool air. Note branches blocked off and centralized return air system.**




**The first floor plans and inserted details show where supply and return openings are located and how branches were carried against partitions. Note that the supply is "blow in," necessitating register velocities sufficient to carry the air stream throughout the rooms.**

# Well Water for Cooling— Coil Heated Air for Heating

IN Kalamazoo, Michigan, there was completed in time for operation last summer, a summer cooling and winter heating system in the building of the Consumers Power Company of unusual interest in that the system cools three floors of the building with deep well water, incorporates roof heat reduction by means of a water pond over the main roof and provides for winter heating with the same system of coils, ducts and fans, but with separate zone booster coils for warming the air.

### Problems of the Building

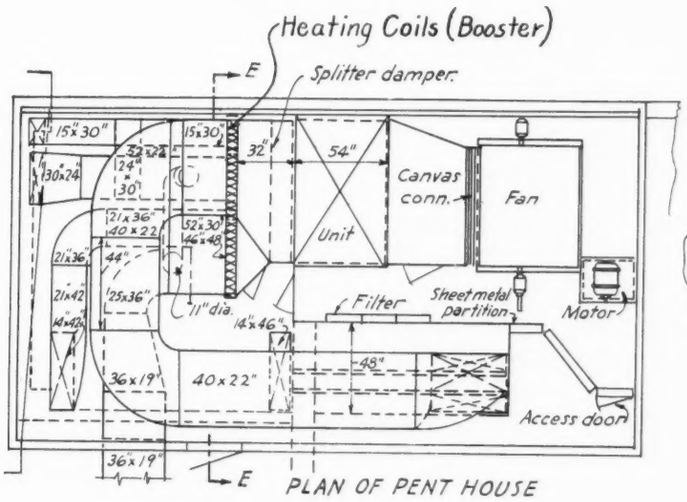
The building is not new; rather its interior has been remodeled several times with rooms added and partitions changed. There was no suitable location for the air conditioning apparatus within the building, so the plan called for the erection of a pent house on the roof to enclose such mechanical equipment as fans, filters, cooling coils for summer operation in the air conditioning unit and the booster heating coils for winter heating. All duct work is within the building excepting one supply and one return main which is above the roof for a distance of some 20 feet. These two ducts are heavily insulated to prevent a loss of heat when the system is used for heating and to prevent a gain in heat when the system is used for cooling. Another important feature of the insulation is to prevent condensation caused by the difference in temperatures of the air inside and outside the duct. Another part of the supply system is carried through the attic space, discharging through ceiling grilles.

The system as installed was designed by the Air Conditioning Department of the Clarage Fan Company of Kalamazoo; fabrication and installation of equipment and metal work was awarded to the Brundage Company, also of Kalamazoo.

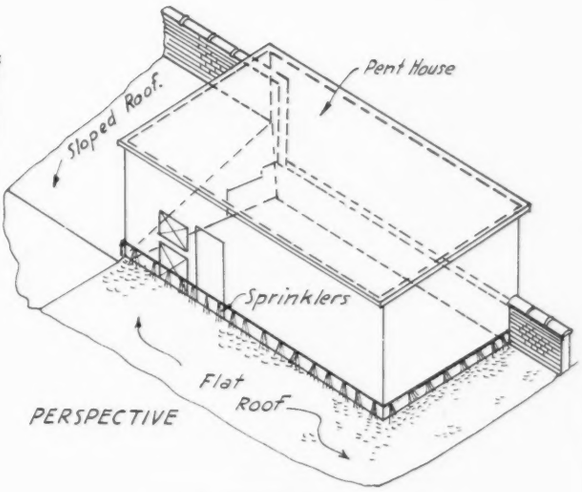
### Design Specifications

The design specifications proposed a system with a capacity to maintain a condition of 80 degrees dry bulb and 50 per cent relative humidity within all first and second floor spaces when the outside conditions did not exceed 95 degrees dry bulb and 75 degrees wet bulb during summer operation and a condition of 72 degrees dry bulb and 30 to 40 per cent relative humidity during winter operation when outside conditions did not exceed a minimum of minus 10 degrees.

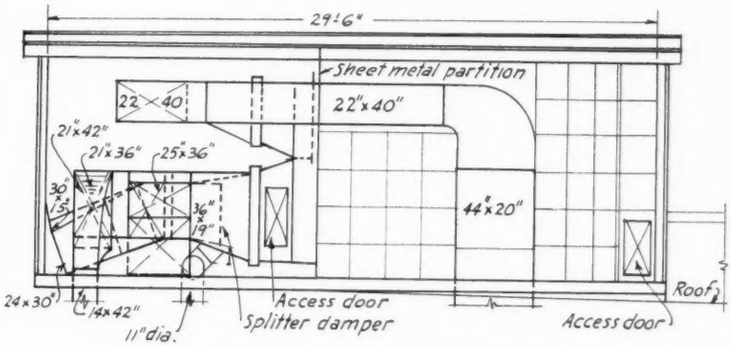
The summer calculations were based upon an



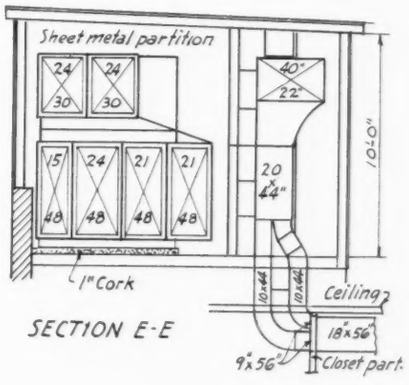

PLAN OF PENT HOUSE



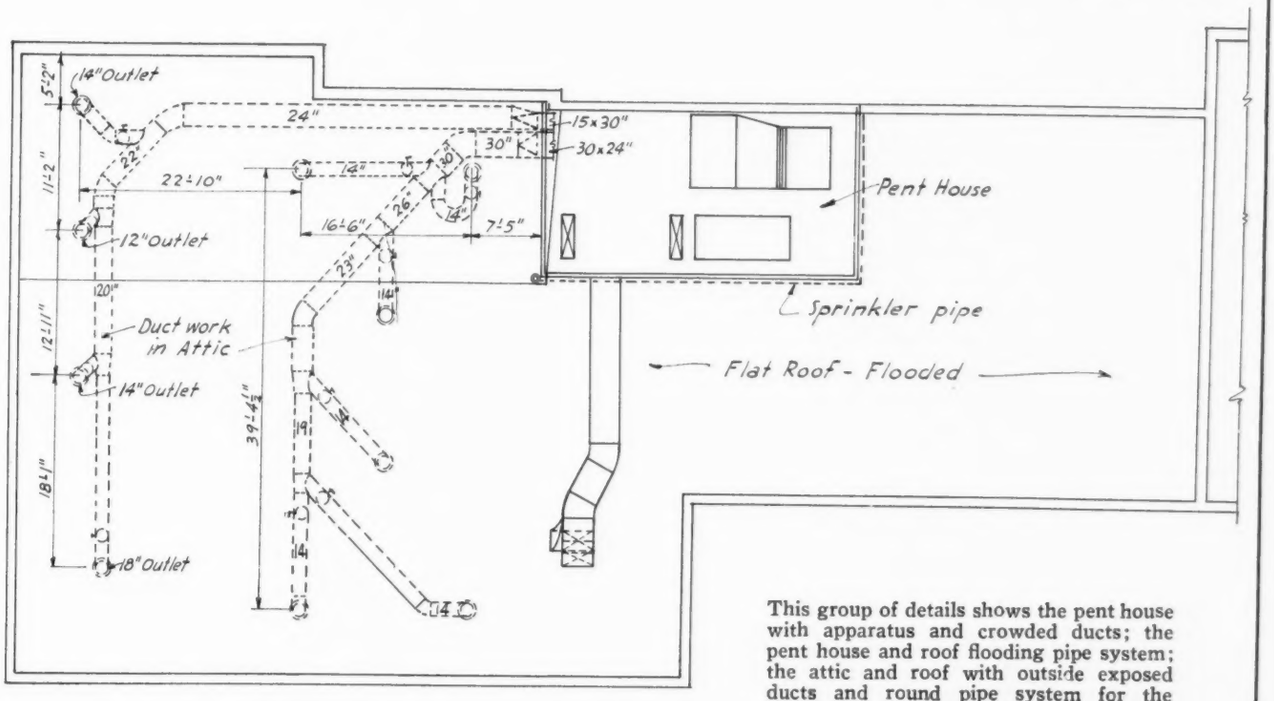

PERSPECTIVE




SIDE ELEVATION

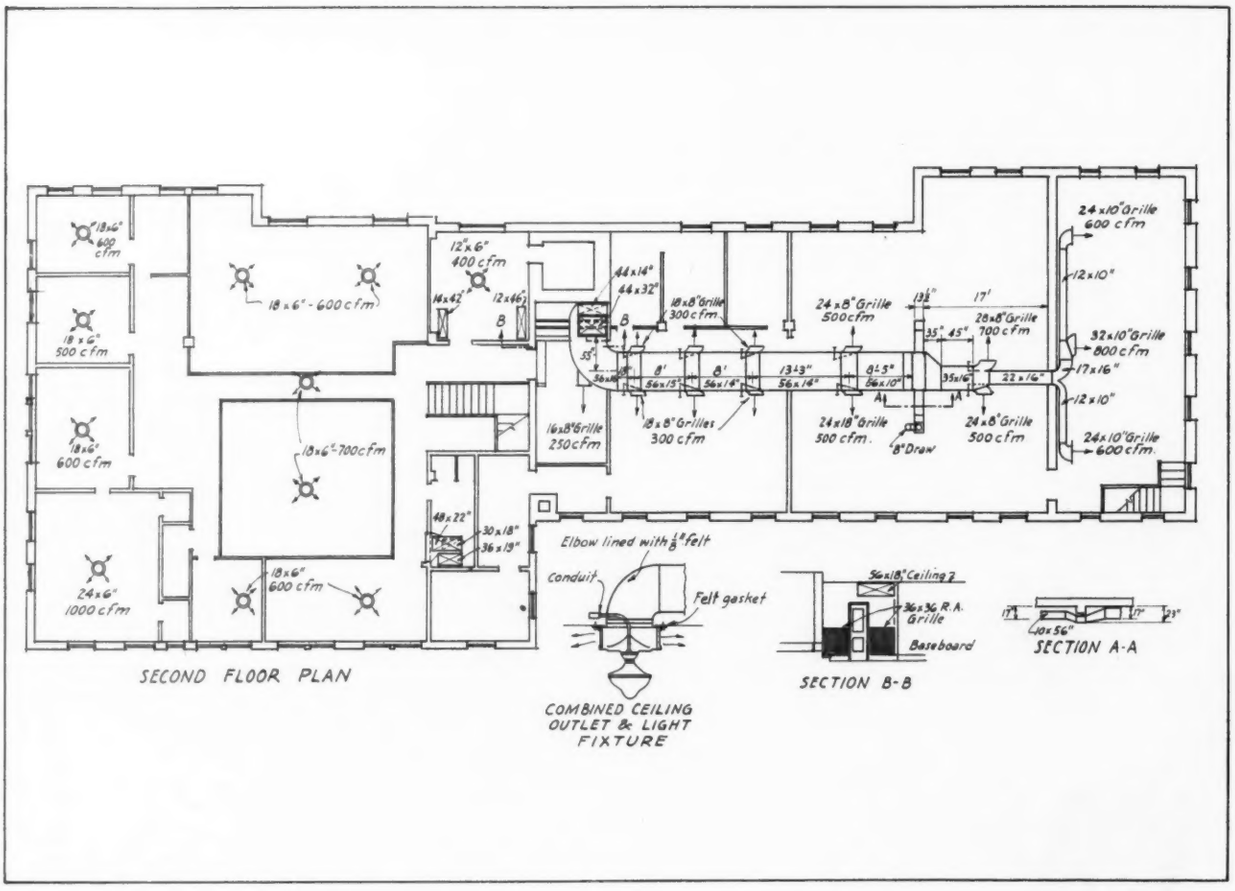



SECTION E-E




ROOF PLAN

This group of details shows the pent house with apparatus and crowded ducts; the pent house and roof flooding pipe system; the attic and roof with outside exposed ducts and round pipe system for the second floor, front. All ductwork was measured for installation.




**On the second floor, air is supplied to private offices through special light fixtures and ceiling openings while the rear, general offices, are supplied from registers in stub branches off the exposed main trunk.**

occupancy of 159 persons and 37.8 KW for lights. Equipment installed has a capacity of 26,000 cfm including a future first floor office. In this total, 21,900 cfm is recirculated air and 4,100 cfm is outside air for ventilating purposes. To cool, it was estimated that 100 gallons per minute of 53-degree water would be required. In winter operations, 1,050 pounds of steam at 5 pounds pressure would be needed at the coils when the outside temperature was minus 10 degrees F.

The air conditioning unit has eight rows of cooling coils with 8-inch eliminator plates and a spray type humidifying system (the air conditioning unit also is used for heating in conjunction with the booster coils).

### The Control System

The type of control system adopted for year round operation is interesting. For summer operation a special differential type thermostat maintains an inside condition readjusted automatically in accordance with outside temperatures. Under this arrangement a condition of 80 degrees is maintained when outside conditions are 95 degrees and for each drop of about 2½ degrees outdoors the inside temperature is lowered 1 degree. Thus large temperature differences are not maintained in moderately warm outside weather. During winter operation the control lowers inside temperatures during the night or over week ends through a clock and mercury tube thermostat. The thermostat, in cooling, operates an automatic valve in the water supply line to the cooling coil regulating the amount of water passed through the coil.

In winter heating the air for the space conditioned is passed through the air conditioning unit where the air is humidified, then through the booster coils where additional heat is added as needed. Each booster coil is given steam through a zone steam valve controlled by a zone thermostat. The fan operates continuously for ventilating purposes.

Air is introduced into the spaces through several types of registers. Special outlets are used in some private offices; combination light and supply outlets in other offices and spaces, and directional registers for other openings.

### Finding Spaces for Ducts

The fabrication and installation of the metal work required a great many accurate measurements by the Brundage engineers. The floor plan and details show that the amount of metal work used is somewhat concentrated in certain areas. For example, the pent house, in addition to the equipment, had to have room for the ducts leading out over

(*Continued on page* 64)

# A Resume of Summer Cooling in the Research Residence†*[Part 3]

By M. K. Fahnestock
Research Assistant Professor of Mechanical Engineering
University of Illinois

**In part I of this report (April) the author described the Research Residence, the test apparatus, and general outline of tests. In the May issue the testing procedure for ice, mechanical refrigeration, night air cooling, and room coolers were set forth in detail. The results obtained with water from the city mains and more room coolers are presented.**

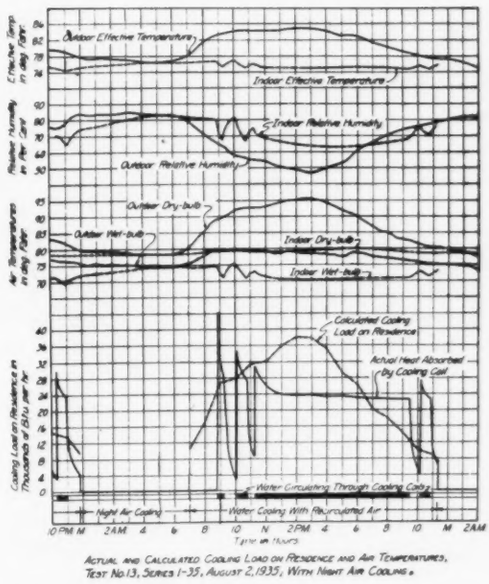
### Results of Tests Using Water from the City Mains

THE comparatively mild summer of 1935 made it possible to supplement artificial cooling during the day with outdoor air circulation at night during the entire season.

The operating characteristics of the plant, the actual and calculated cooling loads, and the indoor and outdoor air conditions during a typical 24-hour period are shown in Fig. 10. At 7:00 a. m., following a period of cooling with outdoor air, the second-story windows and attic door were closed, and the duct system changed over to indoor air and ventilating air circulation. At 8:50 a. m. the temperature on the second story had risen to 80 deg. F., and the thermostat acted to open the motor valve on the outlet water line from the cooling coil permitting water to flow through it. This comparatively simple automatic operation of opening and closing the water supply valve afforded complete and satisfactory control of the cooling plant. From 11:15 a. m. to 9:25 p. m. the plant operated continuously at full capacity, and at 11:20 p. m., following a short period of intermittent operation, the plant was shut down, the windows were opened, and the circulation of outdoor air was started.

On this particular day the outdoor temperature reached a maximum of 96 deg. F. at 2:30 p. m. From about 11:00 a. m. to 6:30 p. m the calculated load exceeded the actual load, while from 6:30 p. m. to 9:25 p. m. the calculated load was less than the actual load. The maximum calculated load of about 37 500 B.t.u. per hour occurred between 2:00 and 3:00 p. m., and the actual load at this time was about 24 000 B.t.u. per hour, which, under normal operating conditions, was the approximate capacity of the plant.

The indoor effective temperature at 8:50 a. m. when the plant started to operate was 76.5 deg. F. This condition, which certainly could not be considered a comfortable one, was due to the unusually high indoor relative humidity of 80 per cent. Although the plant operated to maintain an indoor dry-bulb temperature of 80 deg., the unsatisfactory condition was not materially improved until noon, and even then, and through the period of continuous operation, the lowest indoor




Actual and Calculated Cooling Load on Residence and Air Temperatures, Test No.13, Series I-35, August 2,1935, With Night Air Cooling.

**Fig. 10. Actual and calculated cooling load on residence and air temperature, test No. 13, series 1-35, August 2, 1935; with night air cooling, cooling plant using water from city supply mains.**

†The Research Residence in Urbana, Illinois, was built, furnished, and completely equipped specifically for research work in Warm-air heating by the National Warm Air Heating and Air Conditioning Association in December, 1924.

*Paper presented before the Conference on Air Conditioning by the University of Illinois Engineering Experiment Station, Urbana, June, 1936.

effective temperature attained was 75 deg. The minimum indoor relative humidity during this period was 63 per cent. The results indicated that on days when the outdoor temperature exceeded 90 deg. F. for a major portion of the day and the cooling plant operated continuously, an indoor effective temperature of 75 deg. could be maintained with 58 deg. F. water. While this could not be regarded as an optimum condition for comfort it was a material improvement over that which would have existed without any cooling.

On mild days when the outdoor temperature did not exceed 90 deg. F., the plant operated intermittently and the indoor relative humidity was always above 63 per cent. With this relative humidity the maintenance of an indoor dry-bulb temperature of 80 deg. F. resulted in an effective temperature above 75 deg. F., which was entirely unsatisfactory. This condition could be improved somewhat by operating the cooling plant more often or continuously, and an effective temperature not exceeding 74 deg. could be obtained by maintaining a dry-bulb temperature below 80 deg. F. Under these conditions the relative humidities were usually from 70 to 80 per cent.

From these results it may be seen that the limitation of the plant using water at a temperature of 58 deg. F. was the inability to maintain reasonably low relative humidities. Although a material quantity of moisture was removed from the air, the minimum relative humidity of 63 per cent obtained was relatively high in comparison with 45 per cent obtained with the plants using ice and mechanical refrigeration. The rise in the temperature of the water in the cooling coil was 8 deg. F., giving a mean water temperature of 62 deg. F. The resistance of the coil to the flow of water was negligible, but the pressure loss in the line between the city main and the coil was very large, and in some installations it might be a limiting factor in determining the amount of water that could be circulated through the coil.

### Results of Tests Circulating Night Air

A number of tests with various arrangements of window openings and fan combinations were made and reported in a previous paper In that paper it was shown that the minimum indoor temperature attained with the circulation of outdoor air at night was at about 6:00 a. m. when the windows were closed. Furthermore, it was shown that the effectiveness of different methods of cooling with outdoor air at night could be compared by plotting the drops in indoor air temperatures from the time that the indoor and outdoor temperatures became identical to the time at which the indoor temperature attained a minimum, against the drop in outdoor temperature from the time at which the indoor and outdoor temperatures became identical to the time at which the outdoor temperature attained a minimum. These temperature drops are shown as *B* and *A* respectively in the insert in Fig. 11, which gives the temperature drop curves for several different fan and window combinations. The maximum possible effectiveness would be representative of a condition where the minimum indoor air temperature was the same as the minimum outdoor condition, and this is represented in Fig. 11, by Curve No. 5, a 45-degree line having a

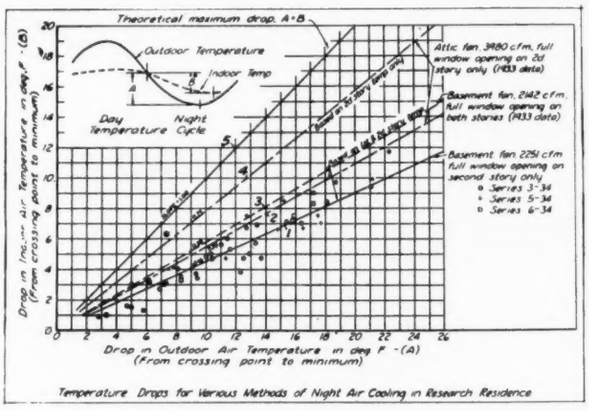

Theoretical maximum drop, A=B
Outdoor Temperature
Indoor Temp
Day
Night
Temperature Cycle
Attic fan 3480 c.f.m. full window opening on 2d story only (1933 data)
Basement fan 2142 c.f.m. full window opening on both stories (1933 data)
Basement fan 2251 c.f.m. full window opening on second story only
Series 3-34
Series 5-34
Series 6-34
Drop in Outdoor Air Temperature in deg F -(A)
(From crossing point to minimum)
Temperature Drops for Various Methods of Night Air Cooling in Research Residence

**Fig. 11. Temperature drops for various methods of night air cooling in research residence.**

slope of 1.0 when the two temperature drops are plotted to the same sale. Curves Nos. 1 and 3 with respective slopes of 0.45 and 0.58 show the temperature drops based on the average temperatures on both stories, when the fan in the forced air system was circulating the outdoor air equivalent of 9.5 air changes per hour. The difference in the slopes of the two curves was due to the difference in the arrangement of window openings, Curve No. 3 representing the condition attained with full window opening on both the first and second stories, and Curve No. 1 representing that attained with full window opening on the second story only. Curves Nos. 2 and 4 show the temperature drops for outdoor air circulations with the attic fan equivalent to 17 air changes per hour based on the two stories, and 33.5 air changes per hour based on the second story alone. Curve No. 2 represents the average condition attained on both the first and second stories with full window opening on both stories, while Curve No. 4 represents the condition attained on the second story with only the windows on that story opened.

### Attic vs. Basement Fan

Considering that in most communities it is undesirable to allow first-story windows to remain open the entire night, the most practical methods of operation may be limited to those represented by Curves Nos. 1 and 2 with windows opened on the second floor only, and the results based on the cooling attained on both stories. A comparison of these two curves shows that in cooling the house as a whole the attic fan was but slightly more effective than the basement fan, even though the quantity of air which is delivered was 80 per cent greater.

Although the temperature drop curve obtained by natural ventilation with full window opening on all stories is not shown in Fig. 11, it is interesting to note that the position of this curve, if included, would be slightly above Curve No. 3, indicating that very effective cooling was attained in the Research Residence without any fan, if the entire house remained opened during the night. However, it is very probably that this residence, with the full third story and its generous number of windows on all stories, was better adapted to natural ventilation than the average house would be.

Experience indicated it was reasonable to consider that the effectiveness of cooling with outdoor air at night was dependent upon the quantity of air circulated, rather than upon the method used, and that the slopes of temperature drop curves as shown in Fig. 11 were legitimate measures of the effectiveness of the different methods. Under these considerations the slopes of all the temperature drop curves obtained when the outdoor air was positively circulated by means of some type of fan are shown in Fig. 12, plotted against the respective quantities of air circulated expressed in air changes per

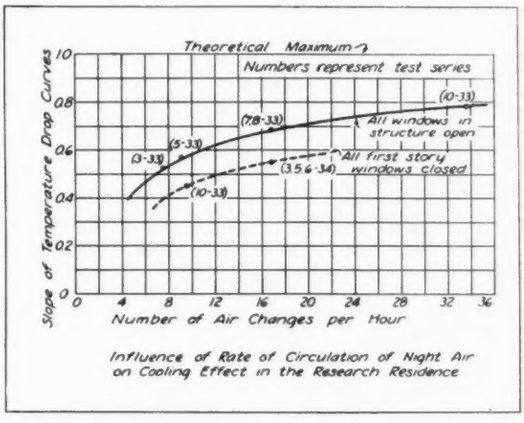



**Fig. 12. Influence of rate of circulation of night air on cooling effect in research residence.**

hour. The upper curve in this figure is based on full window opening and average indoor air temperatures attained in the entire space under consideration. In a two-story house it represents the average indoor conditions attained in the entire house with full window openings on both stories, or the average indoor conditions attained on the second story with full window openings on the second story only. In each case the number of air changes per hour was based on the space in which the windows remained opened. The lower curve in Fig. 12 represents conditions in a two-story house in which the second-story windows only are opened, and the effectiveness of cooling and the number of air changes per hour are based on the entire house.

The curvature of the curves in Fig 12 shows that for the smaller number of air changes per hour the cooling effected increases rather rapidly with increases in the amount of air circulated up to about ten air changes per hour. Neglecting the cooling effect of air motion the curves further indicate that effective cooling with the circulation of outdoor air at night cannot be accomplished with less than ten air changes per hour, and that above thirty air changes per hour the gain resulting from increasing the amount of air circulated is very small.

### Results of Tests With Unit Room Coolers

There were no means available for varying the cooling capacity of the portable unit room cooler *A*, except by starting and stopping the fan which delivered the room air through the unit. This was done by a room thermostat mounted on a support near the center of the room, and the fluctuation in dry-bulb temperature between the on and off periods did not exceed 1.5 deg. F. The average ice melting rate or cooling capacity of the unit when operating intermittently in a room with a dry-bulb temperature between 75 and 76 deg. F. was about 15 lb., or 2400 B.t.u. per hour. The average drop in the air temperature through the unit was approximately 11 deg. F. and the reduction in the moisture content of the air was of the order of 10.5 grains per lb. of dry air. The relative humidity maintained in the room was between 50 and 55 per cent as compared with that of 65 to 70 per cent in the adjoining hall, which was not cooled. The tests with this unit were limited in number, and were made during mild weather when the outdoor temperature did not exceed 90 deg. F. They are, therefore, only indicative of the operating characteristics of the unit, and the cooling load mentioned should not be accepted as that of an average size room in a residence during severe summer months.

### Varying Unit's Capacity

By changing the amount of chilled water circulated through the cooling coil by throttling, or the quantity of air delivered by the fan through the use of the three speed control provided with it, the cooling capacity of the room cooler *B* could be varied over a rather large range. In cooling the entire first story of the residence, including the living room in which the unit and control thermostat were located, the hall, dining room, breakfast room, and kitchen, the maximum amount of chilled water was circulated and the fan was operated on low speed. On a typical day when the outdoor temperature reached a maximum value of 94 deg. F. at about 3:30 p. m., the unit operated intermittently for a period of 11.7 hours, from 1:20 p. m. to 1:00 a. m. on the following morning. During that time it was possible to maintain indoor temperatures of 79.3 deg. F. in the living room, 81.5 deg. F. in the hall, 82.6 deg. F. in the dining room, and 82.1 deg. F. in the kitchen, or an average of 81.4 deg. F. for the entire first story. The maximum indoor temperature on the uncooled second story was 87.5 deg. F. at 7:30 p. m. Although the cooling unit and control thermostat were unfavorably located with respect to the center of the first story, the air temperatures in any one room did not deviate more than 2.1 deg. F. from the mean temperature for the entire first story. The minimum temperature of 79.3 deg. F. occurred in the living room where the cooling unit was located and the maximum temperature of 82.6 deg. F. occurred in the dining room. The average initial relative humidity of approximately 68 per cent was reduced to a value of 58 per cent at the end of one hour's operation, and at the end of five hours' operation it had attained a stabilized value of about 50 per cent. The average rate of heat absorption reduced to an equivalent ice melting capacity and expressed as tons of refrigeration was 0.59 tons. In general, the performance of the unit and the conditions attained on the entire first story were satisfactory, and undoubtedly the variation between rooms would have been improved by a more centralized location of the unit and control thermostat.

# Pattern Development for Air Conditioning Fittings*

By William Neubecker
Head Instructor,
Sheet Metal Department, New York Trade School

## Developing Transition Offset Rectangular to Rectangular Placed Centrally with Flat Back

THE drawing in Fig. 17 shows how the patterns for this type of offset are laid out. In line with the plan view draw the front and side elevations, being careful that the given height or length *a-b* in the side elevation is similar in the front elevation as indicated by *a'-b'*. For the pattern for the front of the offset take the girth of 1-*2-3-4* in side elevation and set if off on the vertical line below the side elevation as shown by similar numbers. Through these points draw lines indefinitely at right angles to 1-*4* as shown. Now take one-half of the wide side of the duct and set it off on either side of the line 1-*4* on line *2* and obtain *A* and *B*.

In similar manner take one half of the narrow side and set it off on either side of line 1-*4* on line *3* and obtain *D* and *C*. Connect these points by lines *A-D* and *B-C* which will be the desired pattern. The dots indicate where slight bends are made to correspond to the angles 1-*2-3-4* in side elevation. The pattern for the flat back is indicated by *5-8-8°-5°* in the front elevation.

The pattern for the sides of the offset is laid out as shown in the upper right hand corner. Take the girth of *5-6-7-8* in the front elevation and place it as shown by *5-6-7-8* in the side pattern. Draw perpendicular lines from these points and make *5-E* and *8-F* equal respectively to the narrow and wide sides of the duct. Connect points, and *5-E-F-8* will be the desired pattern.

The pattern just described can be laid out direct on the sheet metal; all that is necessary is to obtain the pitch of *2-3* in the side elevation and the pitch *6-7* in front elevation.

In this connection it may be proper to call attention, when an offset of the above type has a *projection* at the back, which will require a different procedure in the development of the patterns, so that the full area of the duct is maintained throughout the offset as will be described in the following pattern.

## Developing Offset with Projection at Back

A mistake often made when laying out an offset with a back projection is to draw the side elevation as shown at the *left* in Fig. 18, which shows vertical joint lines as indicated by *A-E*, with a projection at the back equal to *D* and given height equal to the distance between arrow points. Developing the pattern from such a side elevation would not be correct, because the area throughout the offset would not be equal to the area of the duct to which it connects. This can be proven by setting the compass to a radius equal to the duct width *A-E* and using *A* as a center describe the arc shown. Note the distance *B* showing the loss in the area of the offset.

The proper procedure in drawing the elevation to given height and projection is shown at the *right*. First draw the plan in its proper position as shown, with a projection at the back as indicated. Now add this projection to the duct width and set off this distance as shown on the vertical line *F-7*, at right angle to which, from *7*, draw the perpendicular *7-G* equal to the given height. From *G* erect the vertical line *G-6* to meet the narrow side of the duct drawn from the corner *a'* in plan at *6*. Extend the line *G-7* as *G-8*. *5-6-7-8* shows the true angles through the front of the offset.

It is now necessary to find the miter lines as follows: Using *7* as center with any radius describe the arcs *8* and *9*. Using *8* and *9* as centers with a greater radius than before intersect arcs at *b*. Draw the miter line from *7* through *b* to intersect the line drawn from *b'* in plan at *3*. Make *3-4* as desired and draw the perpendicular line *4-8*. In a similar manner obtain the miter line *6-2* by using *6* as a center drawing arcs *e-e'* and *i*. Then from *i* draw the miter line through *a* to meet the rear line of the offset at *2*. 1-*2-3-4* then shows the true angles through the back of the offset.

To prove that the full area of the duct is maintained throughout the offset, set the compass equal to *4-8* and using *3* as a center draw the arc *7-C* which will be tangent to the line *7-6*. The same applies to the upper angle using *6* as center and 5-1 as radius.

Drawing this elevation at the right in correct position is more than half the problem in developing the pattern shapes. The patterns can now be developed.

For the patterns for the top and the bottom, take the girths of 1-*2-3-4* on the top and *5-6-7-8* on the bottom and place them below, on the center line 1-*8* as shown respectively by 1 to *4* and *5* to *8*. Through the points *2-3-6* and *7* draw perpendicular lines indefinitely. Now

(*Continued on page* 83)

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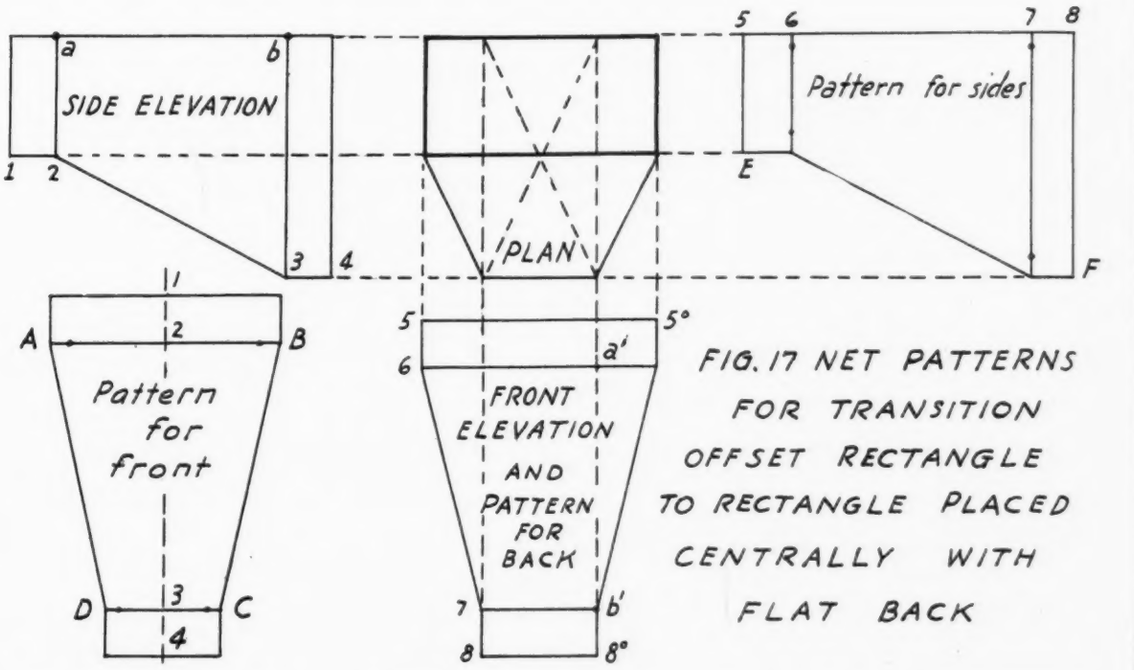


FIG. 17 NET PATTERNS FOR TRANSITION OFFSET RECTANGLE TO RECTANGLE PLACED CENTRALLY WITH FLAT BACK

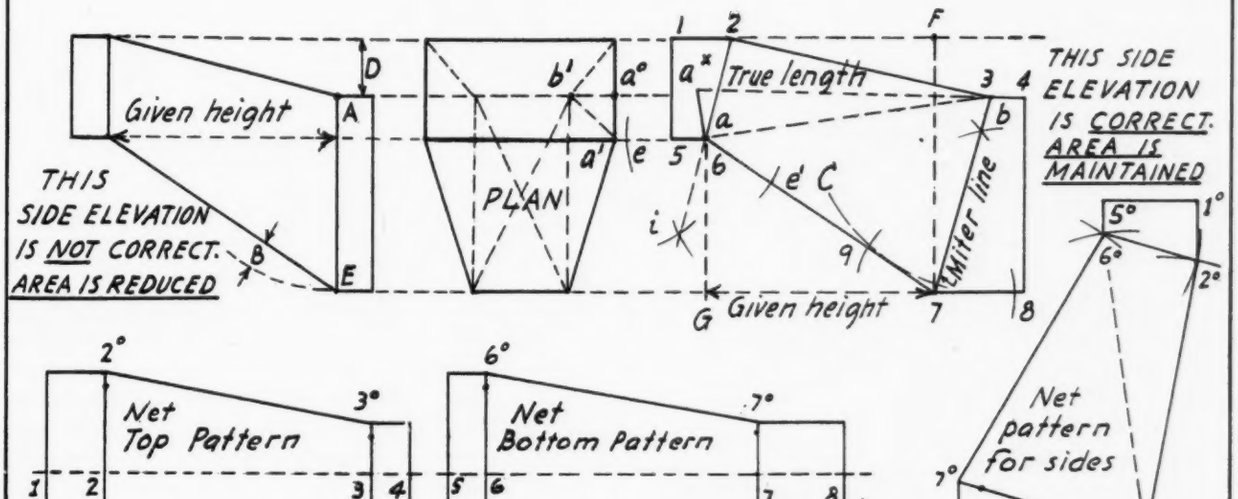


FIG. 18 SHOWING - HOW - FULL AREA IS MAINTAINED IN PROJECTING TRANSITION OFFSET.

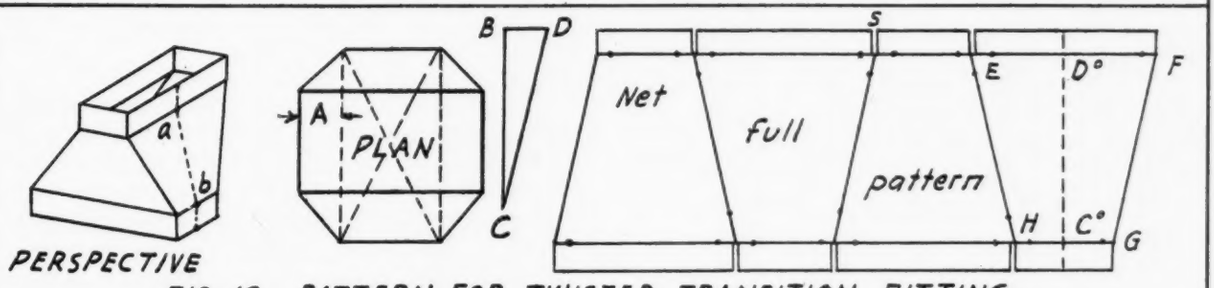


FIG. 19 PATTERN FOR TWISTED TRANSITION FITTING

ALLOW EDGES ON ABOVE PATTERNS FOR DOUBLE SEAMING OR PITTSBURGH LOCK

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Send the coupon and give us a chance to show you the PROFITS you can have—and how STOKER-OLA's gearless construction helps make sales that STAY SOLD to customers who "tell their friends"!

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**Advance Appliance Co., Inc.**

808 S. Washington St., Peoria, Ill.

Send Us Franchise Details

_____

_____


# Calculating the Refrigeration Load

(*Continued from page* 47)

be given by

$Q_r = A_w F\ e\ I$ B.t.u. per hr.,

where $I$ = the actual solar radiation striking the wall surface.

$e$ = the decimal part of the incident solar radiation absorbed by the wall; this varies from 0.4 for very light-colored surfaces like white paint to 0.9 for very dark surfaces like tar roofing material.

$F$ = the decimal part of the absorbed solar radiation transferred into the inside of the wall $= 0.23\ U_w$.

$A_w$ = area of the wall in sq. ft.

Frequently an approximation may be made by adding, say, 25 deg. F. to the outside air temperature for that part of the outside wall exposed to the sun's rays.

### Sun Effect Through Windows

Although certain special glasses are capable of reducing the effect of the solar radiation through glass on the refrigeration load by from 16 to 24 per cent, yet usually from 90 to 95 per cent actually passes through the glass undiminished. The amount of solar heat ($Q_s$) transmitted directly through the glass in B.t.u. per sq. ft. per hr. is given by the expression:

$$Q_s = A_g R_g,$$

where $A_g$ = the area of the glass in sq. ft.

$R_g$ = the amount of solar heat transmitted directly through the glass for the proper latitude and time of day.

Values for $R_g$ must be obtained from suitable handbooks.

Solar radiation through the windows frequently accounts for a very large proportion of the refrigerating load. In a Detroit office building it amounted to 75 per cent, and in the Research Residence the heat gain through the windows alone was about 25 per cent. Some reduction of the refrigerating load may be obtained by nullifying the window losses. An outside awning or outside Venetian blind will reduce the solar radiation leakage by from 75 to 85 per cent, whereas an inside Venetian blind, or a buff colored shade, full drawn, will eliminate about 50 per cent.

### Infiltration

Most residences are constructed in such a manner as will permit an entire volume change of the air in the building with all doors and windows closed in less than one hour. The usual number of air changes per hour for detached houses is from 1½ to 2. In office buildings of recent construction the number of air changes in an office room was found by test to vary from 0.86 with doors and windows closed to 6.2 with the office door open 45 deg. If

Fig. 2. T

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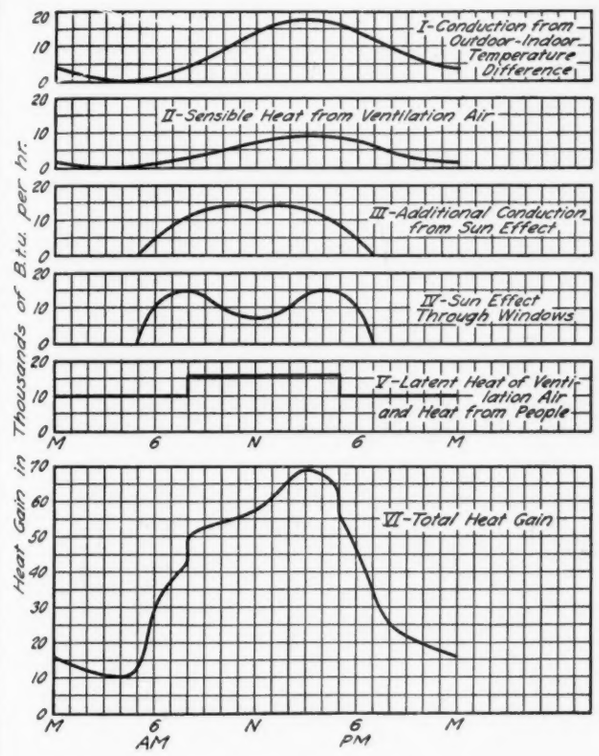

I-Conduction from Outdoor-Indoor Temperature Difference
II-Sensible Heat from Ventilation Air
III-Additional Conduction from Sun Effect
IV-Sun Effect Through Windows
V-Latent Heat of Ventilation Air and Heat from People
VI-Total Heat Gain
Heat Gain in Thousands of B.t.u. per hr.
M 6 AM N 6 PM M

**Fig. 2. Total Heat Gain or Maximum Load on Refrigerating Machine.**

fresh air is admitted it should be controlled, and it should be filtered and dehumified before entrance into the enclosure. That the effect of infiltration is a heavy one may be seen in referring to tests on the Research Residence during the summer of 1932, when over 110 lb. of water vapor per 24 hr. was condensed from the air during the dehumidfication, the greater part of which was assigned to the air of infiltration. Such an amount of condensed vapor would require 0.4 tons, or 800 lb. of ice—an amount that is excessive in a residence for the normally sized family. The refrigeration load due to controlled and uncontrolled fresh air must be calculated by use of psychrometric tables or diagrams.

### Sensible and Latent Heat of People

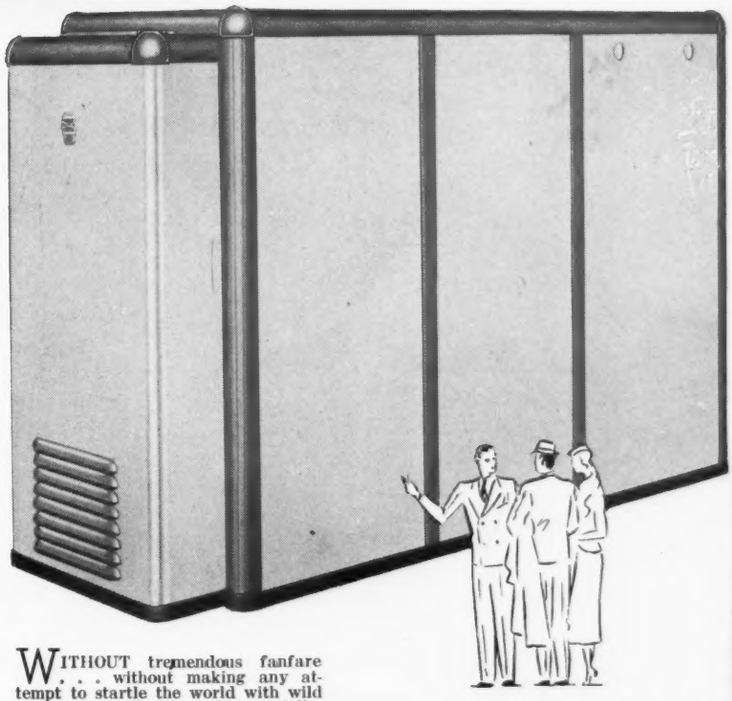
The heat dissipated by the average person is practically constant at 400 B.t.u. per hr. per person over a range of temperature from 65 to 90 deg. F. effective temperature. This is divided into sensible and latent heat, the sensible heat loss being a maximum at the lower air temperatures, and a minimum at about 98 deg. F.

### Heat Generated by Appliances

The load on the refrigerating machine is about 3.4 B.t.u. per hr. per watt in the case of electric lights, toasters, electric irons, electric stoves, and motors. Gas has a calorific value of from 600 to 800 B.t.u. per cu. ft. Unless separately vented, most of this heat becomes a load on the refrigerating machine.

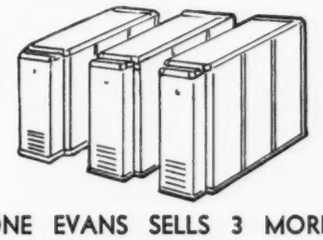
(*Continued on page* 84)


# Why Dealers like the EVANS Fuel Oil Furnace



WITHOUT tremendous fanfare . . . without making any attempt to startle the world with wild claims, Evans has quietly, carefully, surely developed a special fuel oil furnace that *gives great performance in the field.* Dealers everywhere are swinging to the Evans, because

1. **EASY TO SELL:** The Evans has easily explained and unusually effective selling "angles."
2. **LOW COST:** The Evans is the outstanding equipment at the price.
3. **MODERN:** The Evans is completely automatic, thermostatically controlled.
4. **AIR CONDITIONING:** The Evans has a practical, modern, and efficient blower, humidifier, and filter.
5. **FOR OIL ALONE:** The Evan is designed especially for oi Follows natural laws.
6. **SAVES FUEL:** The Evans get more heat out of oil . . uses less oil.
7. **QUICK HEAT TRANSFER** The Evans supplies heat i three to five minutes.
8. **EASY TO SET UP:** The Evar sets up in half the time c ordinary furnaces.
9. **APPEARANCE:** The Evans compact, modern, and a tractive. Standard color, gree
10. **PIONEERS:** The Evans was th first strictly direct fired c furnace. 12 years experienc in this field. The Evans Co poration definitely stanc back of their product.



**ONE EVANS SELLS 3 MORE**

**Records show wherever one Evans Fuel Oil Furnace is installed, 3 to 5 additional installations follow among the friends of the first owner, because recommendations are so favorable.**

**WRITE TODAY!**

The George Evans Corporation, Dept. A. Moline, Illinois

Dear Sirs: Please send complete inf tion on the Evans Fuel Oil Furnac

Firm Name .....

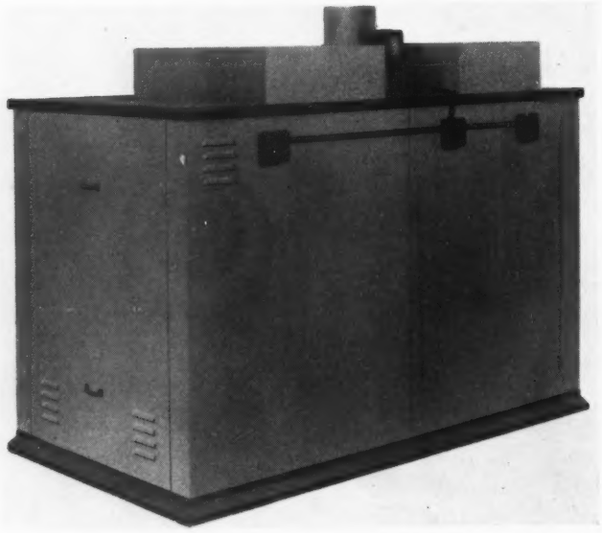
Address .....

City .....State...

THE GEORGE EVANS CORP. MOLINE ILLINOIS

...AND NOW
a newer, better
EVEREDY
CONDITIONED WARM AIR FURNACE

For all kinds of installations whether gravity or forced air; and for oil, coal, or gas firing



WE'VE recently revamped our unit to keep ahead of the modern trend in furnace designs so that you dealers can push the EVEREDY to the utmost. We won't tell you of its superior performance on the job . . . of its startling economy . . . of its sterling performance or of its unmatched appearance . . . we'll just tell you that from the looks of our over-worked shipping department you're pretty good at putting the EVEREDY across to your prospects . . .

*Profits all year for just 3 cents!*

No fooling. Three cents is all you'll spend for the postage stamp when you write us for literature, and all year profits are not a gamble with the EVEREDY, they're a positive fact. Get the stamp and write us NOW! !

Oil Burner Builders, Inc.
BELLEVUE IOWA

## Well Water Cooling System

(*Continued from page* 56)

the roof, the ducts which drop down to the first floor, the ducts turning down to the second floor rear and the round pipe ducts which pass through the attic space for the second floor, front.

By comparing the plans of the pent house, first and second floors, it will be seen that the supply and return serving the cashier's side of the first floor office drop directly down from the pent house through corners in a small, second floor office and end at the ceiling (supply) and floor (return) to the left of the stair. The other supply and return to the first floor drops down through a small, second floor closet, and is connected to the pent house by the twin trunks crossing above the roof and insulated.

### Registers and Grilles

The ceiling registers of the front part of the second floor all connect into the round pipe system in the attic space as shown on the plans. Registers serving the back part of the second floor are supplied from stub branches off a long rectangular trunk which is suspended from the second floor ceiling and exposed. While air is returned directly from the first floor, return is through grilles in the air shaft from the second floor.

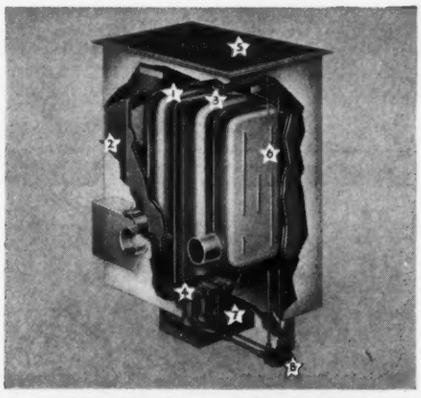
While the locations of all grilles and ducts were shown on the plans prepared by the designing engineers, the Brundage engineers checked all locations by actual measurements on the job. This was considered essential in view of the many turns and complicated fittings required to run from point to point with the metal work. All fabrication was done in the Brundage shop. Sections and fittings were completely assembled and delivered to the job ready to place. Where any minor cutting was necessary to get metal work in place, such fitting was done on the job.

### Operating Results

In operation during last summer, the system performed with entire satisfaction to the power company. Inside conditions well within the specifications were maintained without difficulty and without any greater water or fan load than calculated. After operation was begun the air delivery was balanced with the splitter and cut off dampers installed throughout the ducts and after the balance was achieved the system operated without major change all during the summer. When the pond was used it dropped roof material temperatures several degrees according to observation, but the actual drop was not measured.

# Count-em! 8 SMASHING REASONS FOR SALES SUCCESS

**The NEW Payne Floor Furnace is winning praise throughout the whole gas heating industry. Never before has a new furnace come into the picture with so many outstanding points of superiority—and every one of them real SELLING points!**



THE NEW PAYNE FLOOR FURNACE

1. NEW STREAMLINED HEATING ELEMENT
2. NEW, RIGID UNIT ASSEMBLY
3. NEW LIGHTING ARRANGEMENT
4. NEW BURNER DESIGN
5. NEW FLOOR GRILLES
6. NEW AIR FLOW FEATURE
7. NEW "UNITIZED" BURNER ASSEMBLY
8. NEW GAS VALVE AND MANIFOLD

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# Burnished ● Bearings

## an Exclusive Ohio Feature

ONLY in Ohio Motors are found bearing surfaces so uniform in size and of such glassy hardness. First, the bearings are diamond bored, which produces bearing surfaces of uniform size and in perfect alignment. Then, a ten-step burnishing bar is drawn through the bearings as shown in the illustration. This bar removes no metal whatever but compresses it, leaving a mirror-like finish and increasing the hardness approximately 50 per cent. In conclusion, the bearings are tested for size, and if a tolerance greater than two 10,000ths of an inch is revealed, the bearing is rejected. If your air conditioning unit is Ohio Motor powered, you can be sure it will run, quietly and smoothly.

*All N. E. M. A. and N. E. L. A. conditions are fully met.*

●

OHIO reliable MOTORS

THE OHIO ELECTRIC MFG. CO.
5910 Maurice Ave., Cleveland, Ohio

OHIO MOTORS

## Konzo—Night Air Cooling

(*Continued from page* 53)

1740 to 2120 cu. ft. of air per min. computed at a density of 0.0749 lb. per cu. ft."

The arrangement of the attic fan is shown in Fig. 3. A 24-in. fan was installed in the doorway at the head of the stairs leading from the second to the third story. Thus the air was delivered into the attic space at a point approximately centrally located with respect to the horizontal plane of the third story. It was allowed to escape through windows on all sides. The use of a box and hinged damper on the suction side of the fan, as shown in Fig. 3, permitted outdoor air to be drawn into the open first- and second-story windows at night, or to be drawn through a duct from a third-story window in order to provide positive ventilation for the third story during the day. This arrangement did not interfere with the full capacity of the fan for circulating the air at night, and the somewhat reduced capacity was more than sufficient for ventilting the attic during the day. The attic fan delivered approximately 4000 cu. ft. of air per minute or about twice as much as the basement fan.

### Typical Operating Results

A great number of tests were made over a period of four summers using various arrangements of

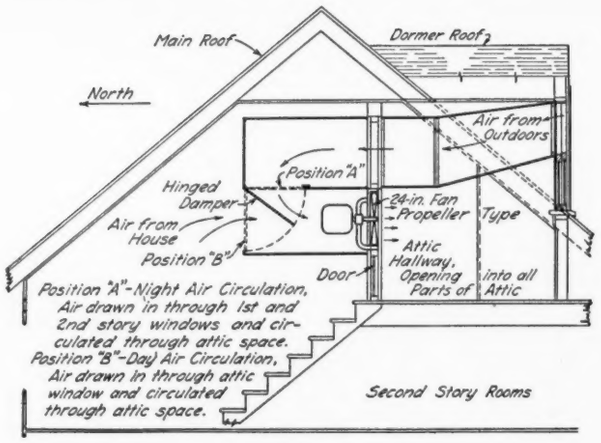
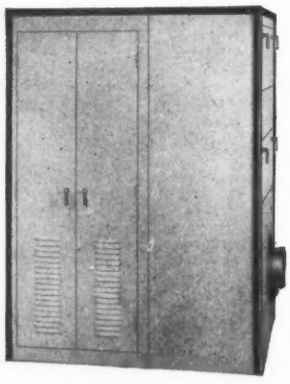

Main Roof
Dormer Roof
North
Air from Outdoors
Position "A"
Hinged Damper
24-in. Fan Propeller
Type
Air from House
Position "B"
Attic Hallway, Opening into all Parts of Attic
Door
Position "A"-Night Air Circulation, Air drawn in through 1st and 2nd story windows and circulated through attic space.
Position "B"-Day Air Circulation, Air drawn in through attic window and circulated through attic space.
Second Story Rooms

**Fig. 3—Arrangement of attic fan in box, permitting air to be withdrawn from attic or from house.**

fans, window openings, and operating schedules. "Fig. 4 shows characteristic curves for outdoor temperatures, indoor temperatures and indoor relative humidities for the least favorable and most favorable methods of operation for two similar days.

"In the first case, shown by the upper curves in Fig. 4, eight windows were partly opened at 9 p. m. and no fan was used. During the early morning hours of June 18 the outdoor temperature reached a minimum of 65.0 deg. F., while the indoor air temperature did not fall below 75.5 deg. F., or a

A COMPLETE LINE
FROM ONE RELIABLE MANUFACTURER



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  as illustrated, includes a welded steel inner body or heat transfer unit, blower and filters, HESS Automatic Oil Burner and controls.
- HESS AUTOMATIC STOKER FURNACE
  includes the HESS welded steel furnace in combination with the HESS Automatic Coal Stoker.
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  are for any fuel and include many quality features for better performance and economy.

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You want to give your customers the finest possible automatic control of their forced air and gravity heating plants—for their comfort, convenience and saving. Cook Controls will help you put it over.

Installation of Cook Controls is simple and easy. They operate quietly, safely, dependably and require no service. And there's a good profit in every sale.

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## Konzo—Night Air Cooling

(*Continued from page* 53)

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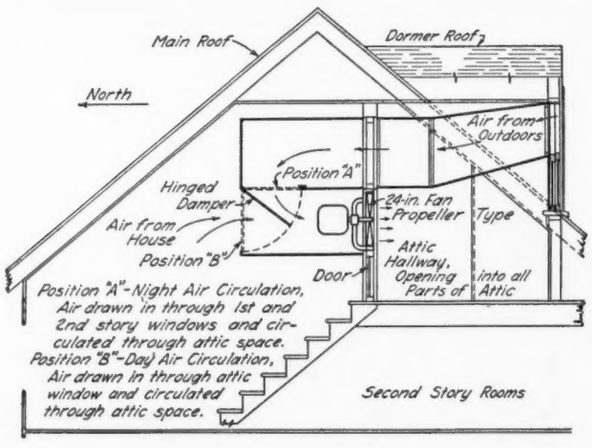
Main Roof
Dormer Roof
North
Air from Outdoors
Position "A"
Hinged Damper
24-in. Fan Propeller
Type
Air from House
Position "B"
Attic Hallway, Opening into all Parts of Attic
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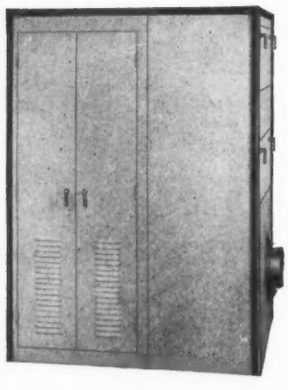

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- HESS CLIMATE MASTER
  as illustrated, includes a welded steel inner body or heat transfer unit, blower and filters, HESS Automatic Oil Burner and controls.
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Installation of Cook Controls is simple and easy. They operate quietly, safely, dependably and require no service. And there's a good profit in every sale.

So stay in there and pitch! Cook Controls will help you put it over. Ask us how.

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difference of 10.5 deg. F. was shown. During these hours the indoor air temperature remained equal to, or slightly above, the temperature of the inside surface of the exposed walls, thus permitting no transfer of heat from the walls except by conduction to the outdoor air. The temperature of the air in the house rose to 84.5 deg. F. the next day.

"In the second case, shown by the lower curves in Fig. 4, the lower sash of all of the windows, which were double hung, was opened to the fullest extent at 6 p. m. and the attic fan was used. The minimum outdoor temperature in the early morning hours of August 12 was 64.0 deg. F., nearly the same as in the first case, but the indoor air temperature dropped to 68.0 deg. F. as compared with 75.5 deg. F. for the first case. That is, the difference between indoor and outdoor temperatures was 4.0 deg. F. as compared with 10.5 deg. F. During the whole night the temperature of the indoor air was distinctly below that of the inside surface of the exposed walls. This permitted heat to be transferred from the walls to the air that was being removed from the house. The temperature of the air in the house next day rose only to 79.5 deg. F. before the windows were opened as compared to 84.5 deg. for the previous case.

"In all cases, the temperature of the surface of the first-story ceilings and of the furniture remained practically the same as that of the indoor air of the room involved. The temperature of the surface of the second story ceiling was usually from

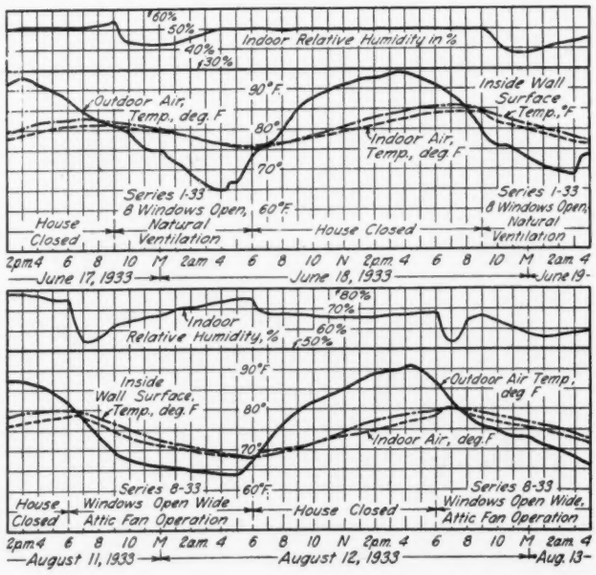


**Fig. 4—Daily temperature cycles showing periods of cooling with air from outdoors at night with least and most favorable methods of operation.**

one to three degrees higher than that of the air in the room.

"From Fig. 4 it may be observed that conditions in the house at 6 a. m. (the time at which the windows were closed), were directly dependent on the weather and the method of operation at night between the opening and closing of the windows.

*The New*
**PEERLESS FURNACE**
*with Built-in Blower Unit*
**—For Oil Burning • Stoker Gas • Hand Firing . . .**

Compact. Stream-lined. Exceptional efficiency due to exclusive Peerless radiator construction—HORIZONTAL FIRE TUBES. Exceptionally large filter area, having five generous size sections. Complete unit extremely adaptable in installation. For instance: cold air may be admitted from either side, front or back. Many other attractive features. Write for full details and prices of this remarkable automatic heat unit.

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**1855 LUDLOW AVE., INDIANAPOLIS, IND.**

PROVIDES FILTERED "JUNE" AIR THE WHOLE YEAR 'ROUND

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## *for the* NEEDS *of the* HEATING EQUIPMENT MAKER

**"IT'S ALL IN THE DESIGN"** ★

The simplest and most efficient oil burners built—"it's all in the design." That's why leading furnace and air conditioning manufacturers are using them. Interchangeable, standard parts "custom-tailor" equipment to any installation. Serviced at the factory when built—lowest operating cost.

Various length blast tubes with flanges cast where wanted on the tube are interchargeable—adapt burner to any thickness combustion chamber, yet enable it to fit into the smallest casings.

## HEAT-PAK COMPACT BURNER

THE BURNER THAT INTRODUCED 'COMPACT' TO THE INDUSTRY

The ideal burner for oil-fired units. It can be adapted to any make now on the market. Adjustable flange or pedestal mounting—or both. Best engineered oil burner built. Note cut-away illustration above.

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THE MOST 'ACCESSIBLE' OIL BURNER MADE

Entire burner can be torn down and reassembled in 5 minutes . . . removal of one screw gives access to nozzle and electrical assembly. Simple, compact, dependable. Makes what little servicing is needed easy and inexpensive.

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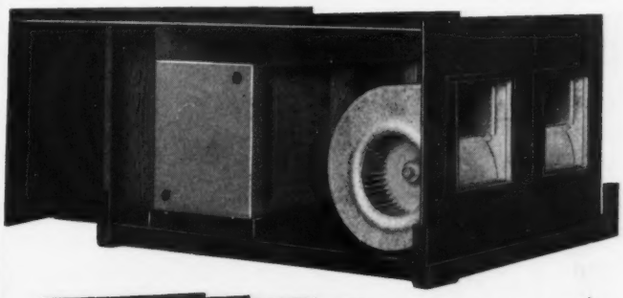
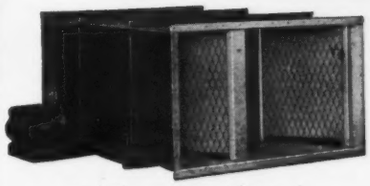
**Provide Tailor-Made Air Conditioning at LOW COST—One Unit for Small Jobs—Series of Units for Large Projects**





Multitherm Unit, inlet end

*Above: Multitherm Unit, outlet end, with side of casing removed showing fans, coil and filters.* Aside from renewing filter packs as necessary and oiling fan and motor bearings occasionally, NO ATTENTION required summer or winter.

## . . for Stores, Restaurants, Theatres, Offices, Factory, Etc.

These expertly designed units—Clarage Multitherms—are the RIGHT answer to a great many conditioning problems, from a simple cooling job to a complete air conditioning installation.

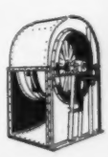
Properly selected from a wide range of sizes, one unit will handle the average office, factory dept., etc.—a series of units recommended for larger air conditioning requirements.

AND MULTITHERMS ARE SPACE-SAVERS—very compact! Installation is easy; building alterations few. Units can be suspended from the ceiling, or installed on the floor. Operation can be made entirely automatic.

## 968 DIFFERENT Equipment Combinations

permit utmost flexibility to meet every need exactly. These efficient units can be used for cooling and dehumidifying; for cooling and dehumidifying plus heating; or for complete conditioning including humidification—well water, a direct expansion refrigerant or brine can be used as the cooling medium.

Clarage builds air washers in six types and many sizes—fans for motor and V-belt drive to meet any capacity requirement as used in comfort and process conditioning.



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CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

### Temperature Drops

The effectiveness of any given method of night operation is directly indicated by the drops in temperature from the time that the indoor and outdoor air attain the same temperature, to the times at which each of these two temperatures become a minimum. See inset in Fig. 5.

Typical performance data giving "a comparison of the temperature drops, A and B, from the crossing point of the indoor and outdoor temperature curves to the minimum outdoor and indoor temperatures for the different methods of night operation are shown in Fig. 5. In comparing different methods of night cooling, temperature drop curves having greater slopes indicate greater effectiveness of cooling, since the maximum possible effectiveness would be attained when the drop B became equal to the drop A, or when the indoor temperature was reduced to the same value as the outdoor temperature. Thus the maximum effectiveness would be represented by a 45 degree line, or one having a slope of 1.0 (curve 6) when the two temperature drops are plotted to the same scale, and any effectiveness less than the maximum would be represented by a line of correspondingly less slope."

If the maximum effectiveness is considered as 100 per cent, then the numerical value of the effectiveness for the different methods of night operation may be obtained by multiplying the slope by 100. In order to show the data in simpler form, the values obtained from the different tests have been

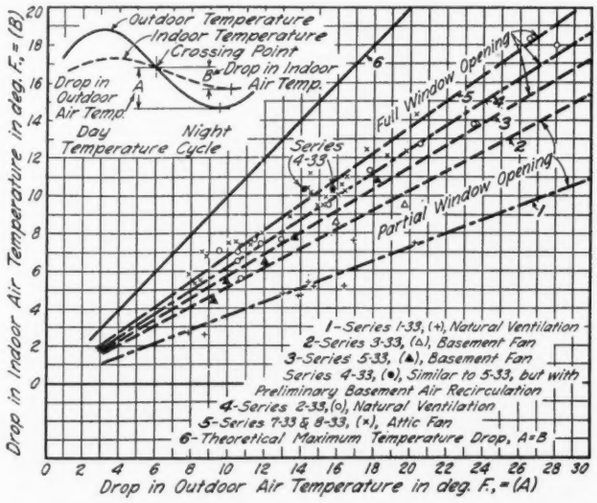
Outdoor Temperature
Indoor Temperature
Crossing Point
Drop in Outdoor Air Temp.
Drop in Indoor Air Temp.
Day
Night
Temperature Cycle
Series 4-33
Full Window Opening
Partial Window Opening
1-Series 1-33, (+), Natural Ventilation
2-Series 3-33, (○), Basement Fan
3-Series 5-33, (▲), Basement Fan
Series 4-33, (●), Similar to 5-33, but with Preliminary Basement Air Recirculation
4-Series 2-33, (○), Natural Ventilation
5-Series 7-33 & 8-33, (×), Attic Fan
6-Theoretical Maximum Temperature Drop, A=B
Drop in Indoor Air Temperature in deg. F. = (B)
Drop in Outdoor Air Temperature in deg. F. = (A)

**Fig. 5—Temperature drops for various methods of cooling with air from outdoors at night with windows opened on both first and second stories.**

graphically illustrated in Fig. 6.

### Windows on Both Stories Open

The data obtained when the windows on both stories were opened, and the temperature drop in the rooms on both stories were considered, are shown in items *g* to *m* in Fig. 6. The following items of interest may be noted from the data:

a. From item *m* it is evident that "when eight windows were partly opened at 9 p. m. the results

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THATCHER has made certain of year round cleanliness as well as year round temperature control by specifying American Air Filters as Standard equipment in their COMFORT MASTER air conditioning units.

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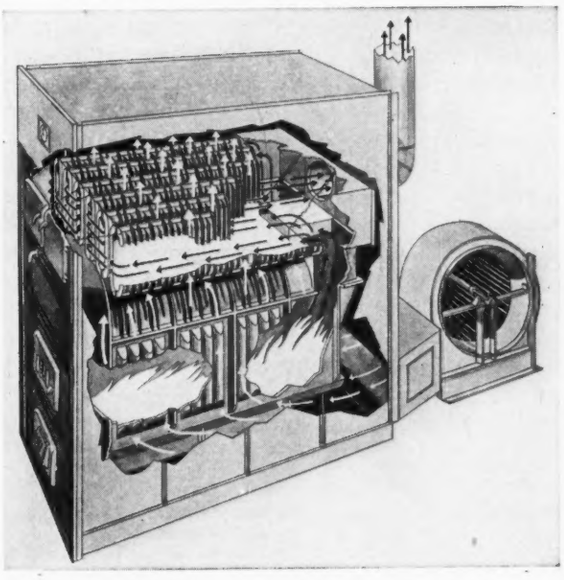
AAF FURNACE FILTERS

THE THATCHER COMFORTMASTER SHOWING AAF FILTERS IN BLOWER UNIT

AMERICAN AIR FILTER CO., Inc., 113 Central Ave., Louisville, Ky., In Canada: Darling Bros., Montreal, P. Q.

# The ACME HEATER

*"It's in the Fins"*



PHYSICAL DATA—LARGE SERIES

| Size No. | Dimensions Length | Width | Height | Grate sq. ft. | Heat Surf. sq. ft. | Free Area sq. ft. Min. | Free Area sq. ft. Max. | Wt. Lbs. | Max. Capacity Btu. |
|---|---|---|---|---|---|---|---|---|---|
| 7 | 6'-6" | 4'-0" | 7'-0" | 10.31 | 260 | 6.55 | 10.25 | 5900 | 900,000 |
| 8 | 8'-1" | 4'-0" | 7'-0" | 11.91 | 340 | 7.73 | 12.50 | 7000 | 1,100,000 |
| 9 | 9'-8" | 4'-0" | 7'-0" | 13.06 | 430 | 8.91 | 14.75 | 8000 | 1,300,000 |
| 10 | 11'-3" | 4'-0" | 7'-0" | 14.43 | 500 | 15.82 | 22.62 | 9300 | 1,500,000 |
| JUNIOR SERIES | | | | | | | | | |
| 2 | 4'-6" | 3'-6" | 5'-8" | 3.9 | 136 | 4.7 | 4.7 | 3200 | 350,000 |
| 3 | 6'-0" | 3'-6" | 5'-8" | 6.1 | 183 | 5.9 | 6.9 | 4800 | 527,000 |
| 4 | 7'-6" | 3'-6" | 5'-8" | 7.2 | 230 | 7.1 | 9.1 | 5000 | 634,000 |
| 5 | 9'-0" | 3'-6" | 5'-8" | 9.3 | 280 | 8.3 | 11.3 | 6000 | 800,000 |

Note: For Automatic Firing Add 10% to Ratings Given.

### Burns Any Kind of Fuel

The design of an all cast iron, direct transmission heater, such as the Acme, is not dependent upon the kind of fuel to be used. Any type of fuel may be burned. Suitable grates may be provided so that bituminous, semi-bituminous, anthracite coal, or other solids may be used with equal efficiency. Replacement of grates and linings by proper refractory material permits the use of automatic stokers on oil burning equipment.

### Large Combustion Chamber

The Acme Heater provides ample space for the ignition of gases of combustion, regardless of the kind of fuel used. The unusually large combustion chamber, acting as "primary" heating surface, effects a very efficient transfer of heat, because of the great temperature difference between the burning gases inside the chamber and the air passing over the outside surface.

### Efficient Radiator Section

Although the heating surface of the combustion chamber is large and efficient, still more heat must be extracted to obtain satisfactory overall efficiency. An inspection of the "phantom view" above will reveal how the gases of combustion enter the rear smoke chamber, flow to the front of the heater, and return again to the smoke-box. It is evident that the gases are held in intimate contact with the heating surface, six times the length of the heater, before they are permitted to escape.

### High Ratio of Heating Surface to Grate Area

The radiator tubes are covered with extended surfaces, or fins, typical of those used on indirect heating coils. The long, oval tubes of the radiator provide an exceptionally large heating surface and, when combined with the surface of the combustion chamber, afford a remarkably high ratio of heating surface to grate area.

### Balanced Construction

The construction of the Acme Heater provides ample free area and allows proper velocity of the air to be heated. Moreover, this air is brought into direct contact with as much heating surface as possible, resulting in the Acme of Efficiency.

**ACME HEATING & VENTILATING CO., Inc.**
**4224 LOWE AVENUE CHICAGO, ILL.**

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## *It describes*

**THE ONLY HEATING PLANT THAT GIVES CONTINUOUS AIR CONDITIONING SERVICE**

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This new 12 page booklet explains a new and proved principle of continuous and synchronized high-low blower and high-low burner operation that practically eliminates air stratification—that comfort destroying variation in heat between floor and ceiling.

There are three smartly styled models of Superfex offering register output of 65,000, 100,000 and 140,000 B.T.U.'s.

Superfex is more than a name, it's a principle of burning oil that you should know all about—the most interesting recent development in winter air conditioning. Superfex has been engineered by the Perfection Stove Company, an organization that has been manufacturing and selling oil burning appliances exclusively for almost fifty years.

Send the coupon today. Attach it to your letterhead or paste it on a one cent post card and the booklet will be sent immediately.

**SUPERFEX** **Complete Automatic Oil Burning Heating Plant that Conditions Air**

*The Mark of Quality*

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VETERAN RUDY DEALERS

Dealers in Rudy Coal, Oil, and Gas Heating and Air Conditioning equipment receive not only the extra volume and profit assured in selling finer equipment . . . they further enjoy the friendly "home office" business alliance established with the Rudy franchise. Rudy dealers are going places. The trend is to better equipment — to Rudy Equipment.
THE RUDY FURNACE COMPANY, DOWAGIAC, MICH.

RUDY

FOR LEADERSHIP LOOK TO THE LEADER

were least favorable. The house was stuffy and uncomfortable all night, and the temperature was far too high for comfort the next day."

b. A companion series, item *l*, "run with the same schedule of window opening and with the basement fan delivering 1740 c.f.m. taken from outdoors, resulted in marked improvement, but did not entirely correct conditions.

c. "From this experience, it became evident that some advantage was to be gained by opening all of the windows, and also opening them earlier, even if the outdoor temperature was somewhat higher than that indoors. For item *j* natural ventilation was utilized 'with all of the windows in the house opened to the fullest extent possible at 6 p. m., and in addition the attic door opened in order to obtain the advantage of the full chimney action of the heated air in the house. Conditions in the house

| | Method of Ventilation | C.f.m. | No. Air change | Windows Open First Story | Windows Open Second Story | Effectiveness of Night Air Cooling in Per Cent 0 20 40 60 80 100 | Per Cent |
|---|---|---|---|---|---|---|---|
| | SECOND STORY ROOMS ONLY CONSIDERED | | | | | | |
| a | Attic | 3440 | 33.2 | None | All | | 78 |
| b | Basem't | 2180 | 9.2 | " | " | | 54 |
| c | Natural | - | - | " | " | | 40 |
| | FIRST STORY ROOMS ONLY CONSIDERED | | | | | | |
| d | Basem't | 2180 | - | None | All | | 50 |
| e | Attic | 3940 | - | " | " | | 36 |
| f | Natural | - | - | " | " | | 30 |
| | BOTH STORIES CONSIDERED | | | | | | |
| g | Attic | 3940 | 16.6 | All | All | | 68 |
| h | Attic | " | " | All half open | | | 68 |
| i | Basem't* | 2120 | 9.0 | All | All | | 68 |
| j | Natural | - | - | " | " | | 62 |
| k | Basem't | 2120 | 9.0 | " | " | | 58 |
| l | Basem't | 1740 | 7.4 | Four | Four | | 52 |
| m | Natural | - | - | " | " | | 36 |

Note.* Preliminary basement air recirculation.

**Fig. 6—Graphical diagram showing effectiveness of various methods of night operation.**

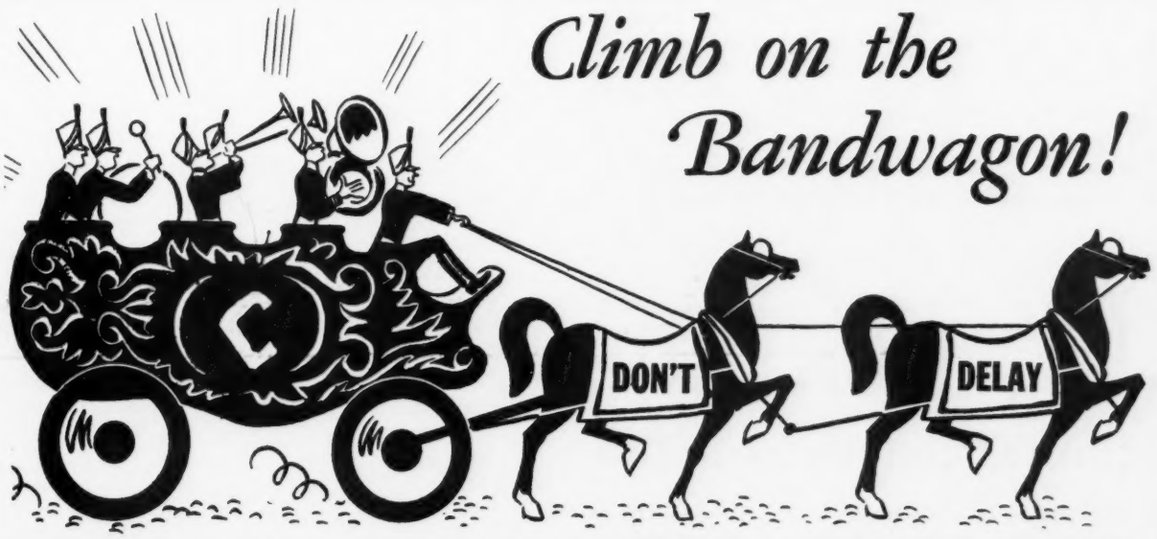
were quite comfortable at night, and the indoor temperatures the next day were not unreasonable.

It is probable that the Research Residence was better adapted to natural ventilation than the average type of residence would be. In houses with only a small trap door in the second-story ceiling and small attic windows, this chimney effect might be greatly reduced."

d. Item *k* was with the "same schedule of window opening as item *j*, but with the basement fan delivering 2120 c.f.m taken from out doors."

e. In item *i* "an attempt was made to take advantage of the reservoir of cooler air existing in the basement by recirculating this basement air through the house for about one hour before opening the windows. This method of operation represented a slight gain over the results from item *k*, but the temperature of the basement air soon rose to practically the same as that upstairs, and the amount of gain cannot be regarded as sufficient to offset the complication in the operating routine."

f. The most favorable results, shown as items *g* and *h*, were obtained when "the attic fan, drawing 3940 c.f.m. into the first and second stories, was used. No difference was observed between item *h* for which the lower sash were raised half

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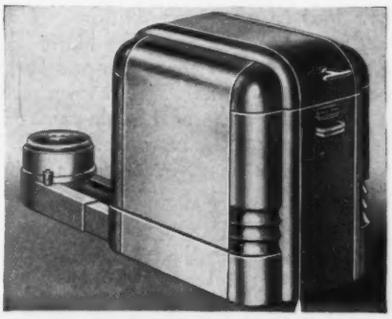

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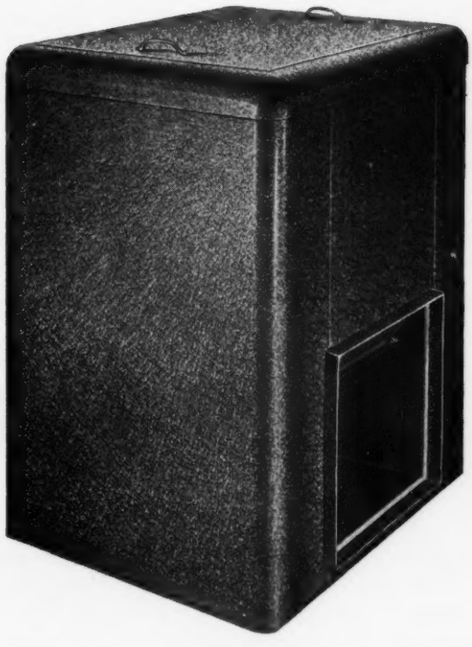
# Lau "NITEAIR" Blower
## *for Summer Cooling*



An attic *blower* for night air cooling that overcomes the many objectionable features so prevalent in fans. Every home owner, apartments, business houses, beer gardens and cafes are prospects for this economical method of summer cooling. The season is here . . . cash-in on summer cooling installations.

## Write Now

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Get Started NOW in Air Conditioning For Stores, Cafes, Shops, etc.

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Modern people like to patronize modern shops and business places. The heads of these establishments know that to meet competition and stay in business they must have cooling. The National Fan & Blower Corporation offers you an opportunity to identify yourself with a nationally known organization engaged in selling the best in air conditioning and ventilating equipment. Now is the best time to make money in this field. We are offering YOU your opportunity.

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A really efficient air conditioning system that YOU can sell and install in small stores, cafes, bars, beauty parlors, offices and other places where the comfort of customers is paramount.

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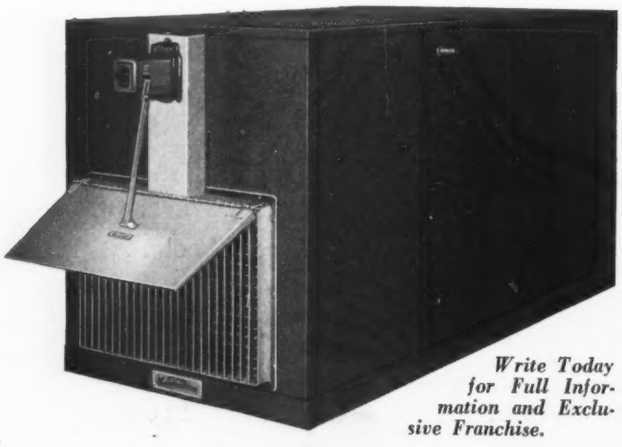

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way, and item *g* for which they were raised all of the way."

g. From Fig. 5 and items *g* to *k*, "it is apparent that there was not a great amount of difference between the three most favorable methods of operation, and that even with 16.6 air changes per hour produced by the attic fan, the indoor temperature was not reduced to the same value as that of the outdoor air."

### Second Story Windows only Open

"Since it is undesirable in the average city residence to leave the first-story windows open all night, series of tests in which the open windows were confined to the second story only were run."

In items *a* to *c* is shown the cooling effected on the second-story rooms, whereas in items *d* to *f* is shown the cooling effected on the first-story rooms. The following items are of interest:

a. Comparing item *a* with item *e* for the attic fan installation it is evident that when the windows were opened on the second story only, more cooling was effected on the second story than on the first Similar data are shown for the basement fan by items *b* and *d*, and for natural ventilation by items *c* and *f*.

b. Comparing items *c*, *f*, and *j*, it may be noted that natural ventilation with the windows open on the second story only was much less effective than natural ventilation with all of the windows in the house open. "When the first-story windows were closed the motive head was reduced by the heights of the first story, and the amount of air was correspondingly reduced."

c. Items *a* and *e* indicate that when the attic fan was used with the second-story windows only opened, that the cooling was very effective on the second story but was quite ineffective on the first story. Hence, this arrangement, although very effective for sleeping quarters on the second story, does not aid materially in cooling down the first story. It would be desirable to have some means of admitting air through the lower story rooms so that the entire house would be cooled off during the night.

d. In this connection items *b* and *d* are of interest. When the basement fan was used and only the second-story windows were opened, the cooling on both the first and second stories was more equalized. "This relatively high effectiveness in cooling the first story probably arose from the fact that, even though the first-story windows were closed, part of the cool air taken from outdoors was delivered through the first-story registers, and hence had some cooling effect on the first story before it could pass through the hallway and escape from the second-story and attic windows."

### Number of Air Changes

"The relative effectiveness of the different methods may be considered as dependent on the amount of air circulated, and not inherent in the particular method used for circulating the air. Sufficient

PLACE YOUR CHIEF RELIANCE ON THE REPUTATION OF THE MANUFACTURER

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# Selling JANITROL

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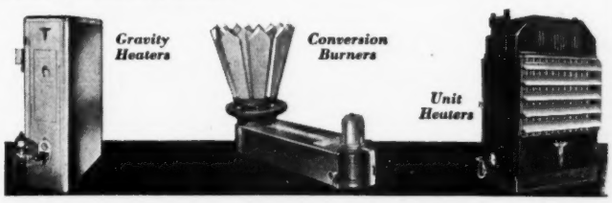
● What is it that 95% of the new building market wants?—Air Conditioning. What fuel is winning wide acceptance everywhere?—Gas.

Here's your market, if you want to make your sales efforts count for more than ever before, this last half of the year. Concentrate on Janitrol gas-fired Winter Air Conditioners, engineered to modern standards, designed for easy sales, easy installation and highly satisfactory service. Outstanding exclusive features, and a powerful national advertising campaign are building enormous acceptance for these handsome, compact Janitrol units. Direct mail campaigns, sales literature, sales training courses and sound-slide films are ready to back up your sales effort. Janitrol engineering cooperation simplifies all drafting of installation plans. Everything is ready to assure your immediate success with Janitrol. Write for details. Surface Combustion Corporation, 2377 Dorr Street, Toledo, Ohio.

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GAS-FIRED WINTER AIR CONDITIONERS

A COMPLETE LINE OF GAS HEATING AND WINTER AIR-CONDITIONING EQUIPMENT FOR EVERY RESIDENTIAL AND COMMERCIAL REQUIREMENT.

# M-VB

## HUMIDIFIER VALVES MEAN AUTOMATIC CONTROL

You can get the famous M-VB Humidifier Valve in four different numbers—for any type of warm-air furnace water-pan. No. 210, installed through pan-cover, float position set. No. 215, installed through pan-cover, float position adjustable. No. 220, installed through side of pan, float position set. No. 225, installed through side of pan with float position adjustable. *Any one of these can be installed in half an hour—without dropping the fire.*

All four numbers control humidity *automatically*, accurately, without attention. Can't corrode or stick, because all moving parts are above the water-line. And there is famous M-VB quality in all of them. You can be sure of an installation that will add to your good reputation.

# M-VB

A complete line of closet tank fittings

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Scovill Manufacturing Company
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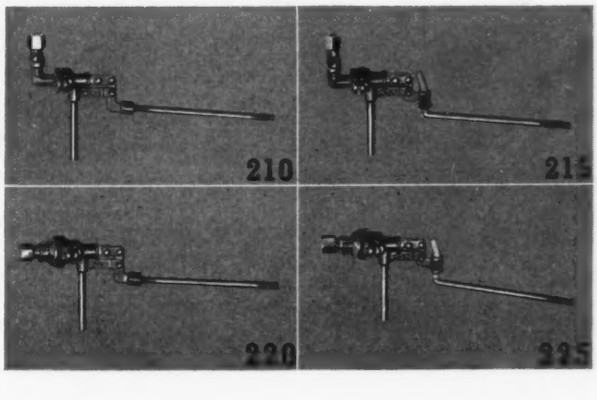

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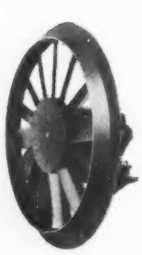
Illustration shows 24" De Bothezat Non-Overloading Disc Pressure Fan, one of 21 De Bothezat units installed to ventilate the exhibition floors of the giant Grand Central Palace in New York City.

*Engineers recommended De Bothezat Fans because:*



1. Large volume of air at low r.p.m. makes for quiet, efficient operation.
2. Non-overloading power characteristic provides long, carefree service without the use of oversized motors.
3. Lower installation cost of axial type fan.
4. Fans operate efficiently against moderate static pressures assuring positive ventilation under all conditions.
5. Actual cost of De Bothezat Fan per unit cubic foot of air cheaper.

The 24" De Bothezat type "L" fan delivers 6550 c.f.m. at free delivery operating at 850 r.p.m.—Standard fan sizes range from 8" to 10'.

For pressure-volume characteristics and dimensions write for the "Selective Series" Bulletin A.

DE BOTHEZAT VENTILATING EQUIPMENT DIVISION
American Machine and Metals, Inc.
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data were available to establish the range of the number of air changes that would be required to prove effective for night cooling in a house of the type of the Research Residence.

"The slopes of all of the curves obtained when the outdoor air was positively circulated are shown in Fig. 7, plotted against the number of air changes per hour. Since a slope of 1.0 represents the theoretical maximum cooling effect that could be obtained, the ordinates of Fig. 7, if multiplied by 100, also represent a percentage of maximum cooling effect attained. Two curves are shown in Fig. 7.

"The upper curves represents conditions in a given space in which all of the windows are opened and the effectiveness of cooling is based on the average temperature in the space. The lower curve in Fig. 7 represents conditions in a two-story house

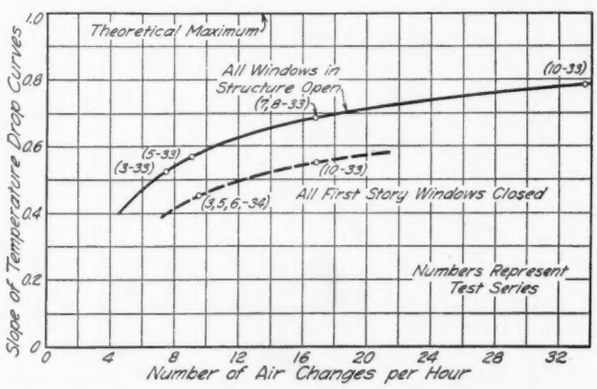



**Fig. 7—Influence of rate of circulation of air from outdoors at night on cooling effect.**

in which the windows on the second story only are opened, and the effectiveness of cooling is based on the house as a whole or on the average indoor temperature for both stories." The following observations may be made from Fig. 7:

a. "It is evident that the effectiveness of cooling the house as a whole is less when the windows on the first story are not opened than it is when the windows on both stories are opened.

b. "It may be observed that with smaller number of air changes per hour the effectiveness of cooling increases very rapidly as the number of air changes increases.

c. "However, the rate of increase in effectiveness becomes much less for the larger numbers of air changes. The increase in effectiveness is limited by diminishing returns.

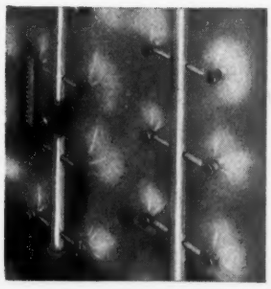
d. "It would require air quantities far in excess of 33.2 air changes per hour in order to reduce the indoor temperature to outdoor temperature.

e. "It is evident that cooling with outdoor air at night does not become reasonably effective in lowering the temperature in the house until the number of air changes per hour reaches a value of approximately 9. Above a value of 30 air changes per hour the gain resulting from increasing the amount of air circulated is very small.

g. "At some point the gain obtained by increasing the number of air changes per hour will probably be offset by the increased cost of fan current.

**[To be continued]**

# For Air Washing



for Air Washing

and

## Humidification

for Humidification

MARLEY 2-PIECE SPRAY NOZZLES wash air thoroughly and economically because they provide a fine, uniform spray and operate efficiently under low pressures. These nozzles machined internally—equipped with removable base plugs—made in all capacities.

MARLEY HUMIDIFYING NOZZLES produce a fine mist easily absorbed by air. Used wherever perishable products make cool, moist air essential. Bronze construction — accurately machined — easily taken apart.

*Write for details and prices.*

**The Marley Co., 1915 Walnut, Kansas City, Mo.**

# MARLEY

**AIR WASHING AND HUMIDIFYING SPRAY NOZZLES**



# NEW IMPROVED MILES JUNIOR *Air Conditioner*

**POSITIVELY QUIET OPERATION**

★

**FOUR FILTERS EXTRA CLEANING CAPACITY**

★

**3-SPEED HEAVY-DUTY MOTOR**

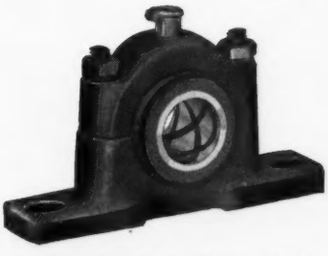
ATTACHES to any gravity furnace. Provides circulating, filtered air. Extra comfort for the home owner. Extra profit for you. Write for circular.

**The HENRY FURNACE & FOUNDRY Co.**

3473 E. 49th St. • CLEVELAND, OHIO



# FOR NEVER FAILING SERVICE USE *Randall* BEARINGS



Randall Standard Pillow Block assembled. (Patented)

Cut-away section of ball of Randall Standard Pillow Block

**Randall Pillow Blocks will last practically a lifetime with a minimum of attention. They are self-aligning, self-lubricating and are clean and quiet in operation.**

**On more than 75% of all air conditioning units produced, Randall Pillow Blocks are standard equipment.**

**Write for new catalog illustrating and describing our full line of pillow blocks.**

***Randall* GRAPHITE PRODUCTS CORP.**

Dept. 611 609 W. Lake St., Chicago, Ill.



# MERCOID ANNOUNCES

A NEW COMBINATION FAN AND LIMIT CONTROL. WRITE FOR PARTICULARS.

**THE MERCOID CORPORATION**

4201 BELMONT AVENUE • CHICAGO, ILL.

*NEW YORK OFFICE* 90 West Street

*BOSTON OFFICE* 25 Ivy Street

*PHILADELPHIA OFFICE* 3137 North Broad Street

Air-Flo Shutters offer the least resistance in the air stream to your fan or blower.

Tie-rod built inside—protected against weather—partially counterbalances louvers—increases air delivery.

Shutter frame extends beyond louvers—prevents fluttering—keeps out rain and snow—fitted with bronze bearings.

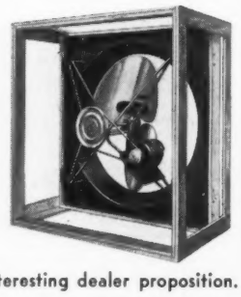
Silent operation—Olive green finish. Also Air-Flo Back Draft Dampers and Deluxe ball bearing shutters.

*Write for catalogue and prices.*

AIR CONDITIONING PRODUCTS CO.
1230—18th Street, Detroit, Michigan

## Silent Air Home Kooler

A unit for every size of home, installed in attic, changes air in entire house sixty times an hour. Home Kooler with atmosphere provided by nature offers most economical method of relief from excessive heat during summer months.



Five sizes, shipped with rubber mounting in crate, which forms a suction box by merely covering with Celotex.

Your territory may be open for this popular line. Write today for interesting dealer proposition.

BELANGER FAN & BLOWER COMPANY
1238—18th Street, Detroit, Michigan

BALANSTAT

*Amazing New*

INVENTION
for the AUTOMATIC BUTLER
COAL STOKER

- It's a new member of an old and leading stoker family—really going to town.
- It guarantees positive and correct air-fuel ratio continuously.
- It guarantees positive maintenance of desired firebed depth.
- It will burn your stoker coal more efficiently than it has ever been burned before—cleanly without soot or smoke.
- Its performance is strikingly convincing and fool-proof.
- It is the missing link in Automatic Heating with Coal.
- It's as dependable as your oldest and best friend.
- You will believe in it 100%.
- You will sell it—and how!
- Your customers will sell it for you—will tell every friend and neighbor of its constant flow of solid comfort, warming warmth, simple, dependable automaticity and thrifty economy.
- Write for first release of complete and startling facts. You'll agree it makes the Automatic Butler the hardest stoker to sell against.

*Stoker Division*

BUTLER MANUFACTURING COMPANY
1273 EASTERN AVE. KANSAS CITY, MO.

## Close—
## Isn't Closed

(*Continued from page* 49)

write or have it already filled out before you visit your prospect and hand it to him as a "note" on the equipment you have selected for his needs.

Let's peek in on a salesman who uses the former method and see just what is his technique. The salesman is talking as he writes.

"And now Mr. Bromley, my company will agree to install—(here he mentions the type of equipment)—which will give you and Mrs. Bromley complete automatic heating to keep your home even temperatured, warm, properly humidified and healthful. (Then as he hands the order blank to the prospect); You will see that the terms are liberal and well—you'll be set to get that real enjoyment out of your home that you've always wanted. I've witnessed the agreement with my signature. All you have to do is sign your name beside mine there and we'll get started immediately to have life as you would have it."

Talking positive while you're filling out the order prevents negatives and resistances from creeping in. If he doesn't sign then, take back the order book, ascertain why he hasn't been sold and again work up to the presentation of the order.

The other method, that of having your order made out in advance is also very effective. In that situation our salesman would probably offer the order like this:

"Mr. Bromley, I've made a note of the equipment our engineer has selected for your home. (Hands the order to prospect). You'll notice we've made the terms very liberal and that I've witnessed the agreement. If you'll just add your signature next to mine we'll be all set to bring you the freedom from heating worries you've always wanted."

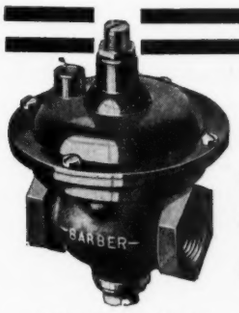
Then, our salesman remains quiet while the prospect is reading so as to allow him to concentrate, but he begins talking again *immediately* when the prospect looks up. In this manner the prospect is not allowed to wander from the subject and oft-times he'll sign without further urging.

One might even carry the order both ways so as to have it handy no matter what the situation. Then you can suit your action to the mood and proceed. Most of all, your mental attitude must be right. If you are afraid to present your order, it simply means that you yourself are not convinced you have completely sold the prospect. Under such circumstances your closing action is almost bound to result in complete failure.

### Big Men—Quick Action

Many times you can lead your prospect into a quick close by discussing the quick action of some of your other well known customers. Some people are naturally slow and deliberate and so you might talk to them like this:

"Mr. Bromley, when Mr. Knudson, the president




Made in ¼", ⅜", ½", ¾", 1", 1¼", 1½", and 2" sizes.

*Be Sure It's a*

# BARBER Gas Pressure REGULATOR

There is no such thing as a "pretty good" Gas Pressure Regulator. A device so important must work within narrow limits and work infallibly. Barber Regulators are built to exact standards of precision, rigidly inspected, and *gas-tested for operation within three-tenths pressure drop.* Neat and compact design, all-bronze bodies, a quality product in every detail. A. G. A. approved, of course. Yet Barber Regulators are moderately priced!

Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

**THE BARBER GAS BURNER CO.**
**3704 Superior Avenue • Cleveland, Ohio**
*The Barber Gas Burner Company of Michigan*
*4475 Cass Avenue, Detroit, Michigan*

# There's Profit for You

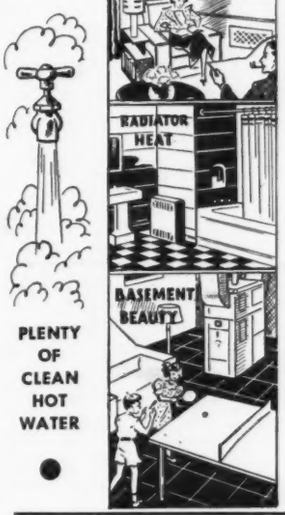
## IN THERMO-DRIP'S FEATURE OF A DRY VAPOR PAN IN SUMMER

● The thousands of homeowners whose warm air heating plants are equipped with the THERMO-DRIP Humidifier won't have to wait until the next heating season to get further benefits from this advanced moisture control. Throughout the summer months, THERMO-DRIP continues to prove to those homeowners that their choice was a wise one. For, when they ceased firing, their *heat-controlled* THERMO-DRIP automatically ceased admitting water to the pan. You know better than anyone else that the resulting absence of moist vapors in cold furnaces halts rusting of furnace pipes and furnace radiators. With this and many other exclusive THERMO-DRIP features, you can easily put yourself in line for easier humidifier sales and profits. Get all the facts now.

**AUTOMATIC HUMIDIFIER CO.**
18th and Main Streets • Cedar Falls, Iowa

SOLENOID
CONTROL VALVES
OVERSHADOW THE FIELD
The tremendous swing toward A-P Controls is a reflection of their incomparable reliability.
By their application to modern humidifying and air conditioning units, A-P Solenoid Valves eliminate the common hazards of leakage, corrosion and obstruction of fluid flow.
Available for water, refrigerants or oil — and a size for every job.
Write for Bulletin Number 410 for detailed description and specifications.
AUTOMATIC PRODUCTS COMPANY
2452 NORTH THIRTY — SECOND STREET
MILWAUKEE WISCONSIN

# HOME OWNERS *want the* 4 BENEFITS *of the* FITZGIBBONS




## BOILER—AIRCONDITIONER

These four outstanding advantages include year-'round HOT WATER SUPPLY WITHOUT A STORAGE TANK, giving you a sound basis for stepping up sales NOW.

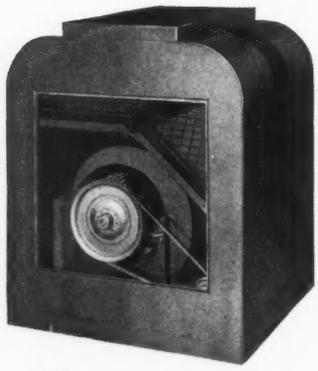
No heavy sections to handle and to join — the single steel boiler unit, comparatively light in weight, goes through a 30-inch doorway, and the air conditioning unit fits accurately upon it. The sea-green steel jacket covering all, beautifies any basement room.

Made in types for any method of automatic firing, which *you* supply. Write to-day for full details.

**FITZGIBBONS BOILER COMPANY INC.**
*General Offices:* Architects Bldg., 101 Park Ave., New York, N. Y.
Branches and Representatives in Principal Cities
*Distributed in Canada by*
FESS OIL BURNERS OF CANADA, LTD.
Toronto and Montreal

**LOOK AHEAD**

*to a Big Season with*



*Peerless*

● Peerless offers you many choices in blower equipment:

**FIRST**—complete belt or direct drive blowers, ready to install.

**SECOND**—blower panels—belt or direct drive—around which you build your own cabinets.

**THIRD**—blower parts such as motors, wheels, pillow blocks, etc., which you assemble yourself.

In any case, Peerless can supply what you need at attractive prices. If you are interested in looking ahead to a big season, write Peerless for more information.

FAN & BLOWER DIVISION

**THE PEERLESS ELECTRIC CO.**
WARREN, OHIO

**LOWER COST**
**Higher Efficiency**

PATENTED AIRE-FOILE
"SILERE" FANS and MAN COOLERS

AIRE-FOILE ventilation equipment is the result of the most careful experimentation. All materials used in construction are the finest obtainable and every fan is rigidly inspected before it leaves the factory, and guaranteed for one year.

No. A-18 Fan—2000 C.F.M.—1/20 H.P.
No. A-22 Fan—4000 C.F.M.—¼ H.P.
No. A-28 Fan—6000 C.F.M.—¼ H.P.
F. O. B. DETROIT

Fans, 12" to 60" Single and Multiple Blade.
PRICE ON REQUEST Also all sizes automatic shutters.

**AIRE-FOILE FAN & BLOWER COMPANY**
4737 W. Vernor Highway, Detroit, Mich.
*Representatives wanted in a few choice remaining territories.*

**AN ALL PURPOSE AIR VELOCITY METER**
ALNOR VELOMETER

**Instantaneous-Direct Reading**
**No Timing**
**No Calculations**
*Write for Folder*

**ILLINOIS TESTING LABORATORIES, INC.**
412 No. La Salle St. Chicago, Illinois

of the bank heard my story the other night, he decided right away to begin to enjoy the advantages automatic heating gives. Mr. Case of the Case Department Store, did the same. So did Mr. Holly, whom I'm sure you know. He said, too, "By golly, I'm going to begin to get a little real pleasure out of life and forget furnace worries and inconveniences".

You see, quick action is characteristic of really big men and by citing this fact to your prospects they are often ashamed to say "I'll think it over". Everyone likes to be regarded in the light of success and to be compared to successful men.

There's also the chance to close a prospect after getting ready to leave. This is particularly true when you have been up against a stiff cost objection. The "closer" would probably handle that situation something like this:

"Well, Mr. Bromley, if you really don't have the money, then I guess we can't install real automatic heating for you. (Then a slight pause). Say—by the way are you people thinking of having your present heating system cleaned or repaired, or maybe some cleaning or redecorating done this fall?" The prospect in all probability will say he hadn't thought much about it and ask why you inquired. From that point on you can go back into your hidden costs story of outmoded, dirt producing, heating equipment and so on back in to your presentation—even opening your kit again if necessary. You see, your prospect's guard has dropped. He doesn't realize that you are about to do more selling and talks to you only in the manner of answering your questions. Be sure you are nonchalant about it, though, or he'll get the idea you are high pressuring him.

### Don't Miss Opportunity

In closing, you must be constantly on the alert for every opportunity that you can make work for you. For instance, if your prospect says he is trying to sell his house, you can immediately tell him the story of increased property value if his house is completely modernized. Put it up to him squarely. Ask him if he wouldn't buy a house completely equipped with modern heating equipment at a slightly higher price? He can only answer in the affirmative and when he begins to agree with you you can lead him quickly and easily up to the closing point.

The direct question will many times show you your best line of attack and how to overcome it. In other words, when the customer says "I'll think it over"—don't be afraid to ask a question like this:

"Well, Mr. Bromley, I don't blame you for being careful and deliberate, but would you mind telling me just exactly what is it you want to think over?"

More often than not, this will unlock the gate for you and give you the clue to what has been up to that time your weakest point of approach. If he insists on answering in generalities than you insist on having specifics. In other words, stick and stick until you at least find out exactly why he will not buy. And, too, very often the wife can give

"Nu-way" Genii

LISTED AS STANDARD BY THE UNDERWRITERS LABORATORIES

OBI

## QUALITY—MR. DEALER

**is the only safe basis upon which to build your business.**

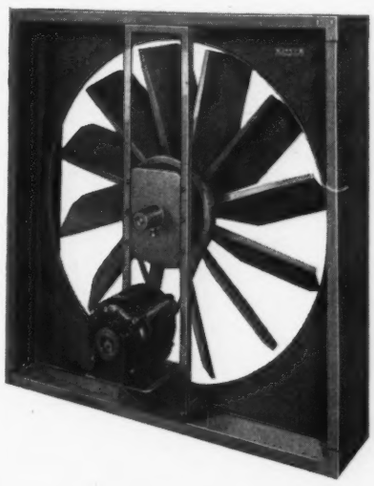
**Any other factor as a basis—will over a period of years leave you without profit—without reputation and without a business.**

**Quality in oil burning equipment is more essential today in this turbulent market situation whereon a multitude of inferior products are being offered the uninformed customer.**

**The Nu-Way Corporation builds quality into its products—fine finish—grade A materials—honest machine work—all of which is dictated by the wisdom of experience.**

**Mr. Dealer—if you are building for permanency—write today for the Nu-Way proposition.**

**THE NU-WAY CORPORATION**
**Rock Island, Ill.**



## ALLEN ATTIC FAN

**SILENT EXHAUST**

**(Made by the Manufacturer of ALLEN Multi-Vane and Electro-Wind Turbine Ventilators.)**

Just the fan to help you boost your summer sales. It will quickly cool a house by drawing out the hot attic air thus causing a new, fresh air circulation through the lower floors of the house. Driven by a standard motor, v-belt drive, and rotating on the best bearings obtainable it will perform for many seasons without attention. Drop us a line today for helpful sales literature.

Sizes: 24 in. to 60 in.—¼ to 1 hp—4400 to 31,300 c.f.m.

Dimensions: 30 x 30 to 72 x 72. Moderately priced.

**THE ALLEN CORPORATION**
9752 Erwin Avenue Detroit, Mich.

## DESIGNED FOR AIR CONDITIONING

### *Engineered Air Distribution Outlets*

- UNI-FLO Grilles and Registers permit the use of higher air velocities than ordinary outlets.
- They also allow the use of greater air temperature differentials. These two factors reduce the size and number of ducts and outlets.
- The air stream is highly diffused, due to the exclusive UNI-FLO fin design.
- Directional fin arrangements can be **pre-planned** for correct air distribution.

*Send for Data*

**BARBER-COLMAN COMPANY • ROCKFORD, ILL.**

Twenty years of experience in making heat regulating equipment are back of every

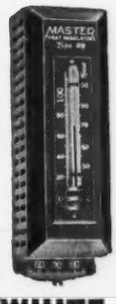
## MASTER HEAT REGULATOR

Whether your customer belongs to the upper 400, or lives on Main Street, there is a Master Regulator that will satisfy him in quality and price, and pay you a satisfactory profit—for example

**TYPE B-22** **$13.50**

*for only*—(to Dealer)

Silent, accurate, listed as Standard by Underwriters Laboratories. Just right for your biggest market—the moderate salaried home owner.



*Write for details TODAY*

**WHITE MANUFACTURING CO.**
2362 University Ave., St. Paul Minnesota

you the opportunity you need to force the closing action. It shouldn't take you long to ascertain whether or not she plays an important part in the selection of home appliances or equipment. If she does, then sell her hard on the advantages, but always continue to include her husband in every discussion. Bring out to her that it is mostly for her convenience that her husband would like to have the new heating equipment installed. She is at home much more of the time than he is and so derives the most benefit from automatic heating. Show her that she will be rid of endless climbing of basement steps and that with proper equipment her household duties will be lightened. It's good closing action and often makes a sale otherwise lost.

### How to Build Your Close

The secret though (if there is any secret) is to have your closing action planned in advance of your interview. Automatic heating equipment is rarely, if ever, sold on a single call. On previous calls you must note those points which are strongest in your favor and then carefully design your action to fit them. Then you must make the acid test and that is to see if your closing arguments sell *you*. You must assume your prospects frame of mind and build your close to sell *you*. If it won't do that, how in the world do you expect it to have any effect on the prospect?

VIKING
Cir-COOL-ator
THE NEW COMPLETE KIT
for ATTIC VENTILATION
MADE COMPLETE FOR YOUR CONVENIENCE; PRICED LOW FOR MAXIMUM SALES
VIKING AIR CONDITIONING CORP. CLEVELAND OHIO

ECONOCOL
Join the nation's fastest growing industry by lining up with ECONOCOL. It's the leader in *performance, low upkeep, appearance,* and *value*. Write today for details on profitable, exclusive dealer franchise.
ECONOCOL STOKER DIVISION OF COTTA TRANSMISSION CORP., Rockford, Ill.
STOKERS

INTERNATIONAL
FANS & SYSTEMS
Complete industrial line. Important installations in many fields. Full information on models, diameters, and capacities upon request.
INTERNATIONAL ENGINEERING, Inc.
DAYTON, OHIO

CHAMBERLIN
AUTOMATIC HUMIDIFIER
DEPENDABLE—PROFITABLE
FITS ANY FURNACE—ONE PIECE CASTING
VALVE FREE FROM LIMING
Here's a fully automatic trouble-free humidifier cast entirely in one piece. Valve completely out of water. Trap cast integral reduces liming. Quickly installed. Manufactured over 10 years. Write for literature and prices.
CHANDLER COMPANY
CEDAR RAPIDS, IOWA

ELGO AUTOMATIC SHUTTERS
Use ELGO Shutters on all your fan and blower installations to protect the duct work and motors from inclement weather and prolong their life on the job.
ELGO Shutters are recognized as the leaders in the field and are on most installations of any merit. Drop us a line for free literature and price list.
ELGO SHUTTER & MANUFACTURING COMPANY
634 W. Warren Ave., Detroit, Michigan

## Neubecker Patterns

(*Continued from page 60*)

set the dividers to one half of the narrow side of the duct and set this off on either side of the center line 1-8 on lines 3 and 7. In similar manner take one half of the wide side in the dividers and set this off on either side of the center line 1-8 on lines 2 and 6. Connect these points which will give the top and bottom patterns.

As the projection $a^\circ$ $b'$ in plan is similar for both sides, then the pattern for the one side will answer for both and is laid out as follows: Take a reproduction of 3-4-8-7 in elevation and reproduce it as shown by $3^\circ$-$4^\circ$-$8^\circ$-$7^\circ$ in the side pattern. Now with $7^\circ$-$6^\circ$ in the bottom pattern as radius and $7^\circ$ in the side pattern as center, draw a short arc near $6^\circ$.

To obtain the radius $3^\circ$-$6^\circ$ in the side pattern, draw a line from 3 to 6 in the side elevation as shown. As the one end of the offset $a^\circ$ in plan projects a distance equal to $a^\circ$-$b'$ from the other end of the offset $b'$, then take this distance $a^\circ$-$b'$ and set it off at right angles to the line 3-6 in elevation as shown from $a$ to $a^x$ and draw the line $a^x$-3 the *true* length of the line 3-6 in elevation.

Now with radius equal to 3-$a^x$ and $3^\circ$ in the side pattern as center, intersect the arc previously drawn at $6^\circ$. Using $3^\circ$-$2^\circ$ in the top pattern as radius and $3^\circ$ in the side pattern as center, describe a short arc near $2^\circ$ and intersect it by an arc struck from $6^\circ$ as center, with the miter line 6-2 in the side elevation as radius. Draw lines in the side pattern from $7^\circ$ to $6^\circ$ to $2^\circ$ to $3^\circ$ and reproduce 1-2-6-5 in the side elevation, as shown by $1^\circ$-$2^\circ$-$6^\circ$-$5^\circ$ in the side pattern. $1^\circ$-$4^\circ$-$8^\circ$-$5^\circ$ will then be the desired pattern. The use of *miter lines* in work of this kind will avoid choking the area.

### Developing Twisted Transition Fitting

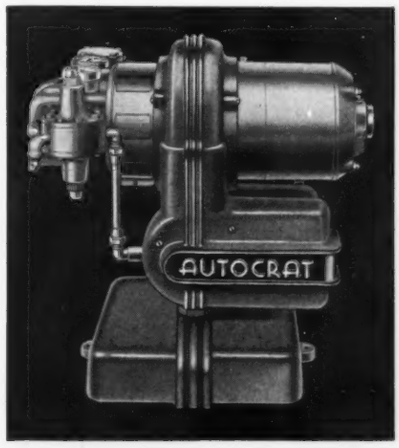
A perspective of a twisted transition fitting is shown in Fig. 19. This is a fitting of a rectangular duct where the partitions on the upper floor crosses the partition on the lower floor at right angles thus requiring the duct to make a quarter turn as shown in the plan view.

This is a simple problem and can be laid out direct on the metal sheet. All that is required is to know the length of the *pitch* from $a$ to $b$ shown in the perspective view. This pitch can be obtained by using the steel square as shown to the right of the plan. Knowing the *vertical* height of the transition, set it off on one length of the square as shown by B-C and on the other leg set off the distance B-D equal to the projection A in plan which is similar for all four sides.

In practice no plan view is necessary. Assuming that the duct is $4 \times 10$ inches then: $10 - 4 \div 2 = 3$, the distance of B-D. Now take the length of D-C and set it off on the vertical line, drawn on the metal sheet as $D^\circ$-$C^\circ$, through which points draw horizontal lines as shown. Set off one half of the wide and narrow sides of the duct on either side of the line $D^\circ$-$C^\circ$ as shown respectively by E-F and H-G. Draw lines from E to H and F to G. Then will E-F-G-H be the pattern shape for one side. If the duct is of a small size, the four sides are joined in one as shown. Cut a notch at each collar corner as indicated by S (at one corner), which allows for the bends to be made along the collar angles.

**AUTOCRAT**

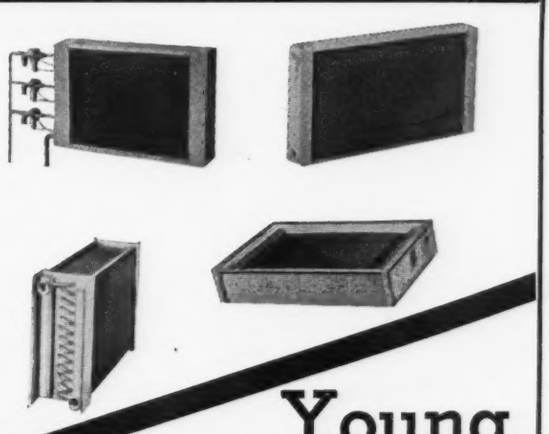
**Offers YOU a complete range of models and prices.**




Model DA-1

**YOU don't guess at results when you install an AUTOCRAT. LIFETIME Duplex Valve, LIFETIME Alignment and LIFETIME Dependability spell PROFITS for you plus complete customer satisfaction. STOP guessing! GET THE FACTS! Write for Catalogue B-1 TODAY!**

**Autocrat Oil Burner Corp.**
**Cedar Rapids, Iowa, U.S.A.**



**Young**
**COILS FOR HEATING— COOLING — AIR CONDITIONING**

**The Young line of heating and cooling surfaces is complete and well graduated to permit the selection of a unit to meet exact specifications. Each unit is light weight, compactly designed and properly tested to do a definite heating or cooling job. Write for descriptive literature.**

**Offices in All Principal Cities**

YOUNG RADIATOR COMPANY
RACINE, WISCONSIN
Young Quality

## Cooling With Well Water

(*Continued from page* 51)

**Ton of Refrigeration** = The removal of heat at the rate of 12,000 B.T.U.'s per hour.

**Latent Heat**—(is the heat given off by water vapor when condensed to a liquid without affecting the water temperature. 1 pound water vapor during condensation gives off 1000 B.T.U.'s (approximately as used here).)

**Sensible Heat**—produces a temperature change. It is indicated by an ordinary dry bulb thermometer.

**Total Load**—is the sum of both sensible and latent heats. The Wet Bulb temperature is an exact indication of total heat.

**Dry Bulb Temperature**—(D.B.)—The temperature indicated by any ordinary thermometer not affected by the moisture content of the air.

**Wet Bulb Temperature** (W.B.)—The temperature that results from encasing the bulb of an ordinary thermometer with a fine mesh cloth moistened with clean water and whirling the thermometer through the air until a steady temperature is reached.

**Dew Point** (D.P.)—The temperature at which the air is saturated with moisture. When air is cooled below the dew point it gives up moisture.

**Relative Humidity** (R.H.)—The amount of moisture contained in the air as compared with the amount the air would contain at the same temperature if saturated. At 100% R.H. the air is saturated with water vapor and the D.B., W.B. and D.P. temperatures are the same.

**[To be continued]**

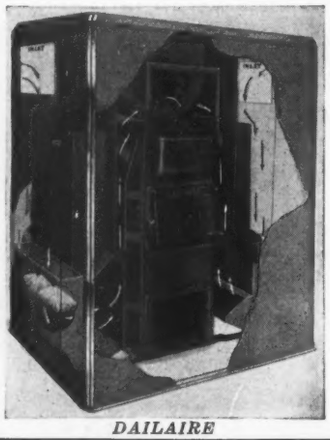
## Calculating Cooling Load

(*Continued from page* 63)

The maximum load, from which the capacity of the refrigerating machine is determined, can be found only by adding the separate items with due respect to the time the load occurs. This may be done best by plotting as shown in Fig. 2. (Page 63.)

### Conclusion

In an auditorium, restaurant, or other place for public gathering the cooling load may be principally a human load. In the residence or office, the cooling load probably is one due to solar radiation, heat leakage, and infiltration. From the point of view of heating as well as cooling, it seems that attempts to reduce these factors by storm windows and doors, weatherstripping, insulation in the walls and ceilings, and the use of some device to reduce the effect of solar radiation is a very good investment. Undoubtedly, the use of night air can be depended on to freshen the indoors satisfactorily, but after sunrise during the day time all doors and windows should be closed.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**OFFERS YOU MANY "POINTS OF SUPERIORITY"**

1. Chrome Steel "Streamlined" Combustion Dome.
2. Overhead Blowers. More Durable . . . . faster radiation.
3. Counterflow Principle
   Greater Humidity . . . . captures large quantities of heat that usually escapes.
4. Divided Radiators
   Giant radiators with two to four times more radiation surface.
5. One neat compact casing gives year around comfort.

The Dailaire advanced system of heating and air conditioning is a field tested, time-proven investment in comfort and economy.

WRITE US TODAY FOR FURTHER DETAILS ON OUR DEALERSHIP PLAN

**DAIL STEEL PRODUCTS COMPANY**
1050 MAIN ST. LANSING, MICHIGAN

**For STOKERS and BLOWERS!**

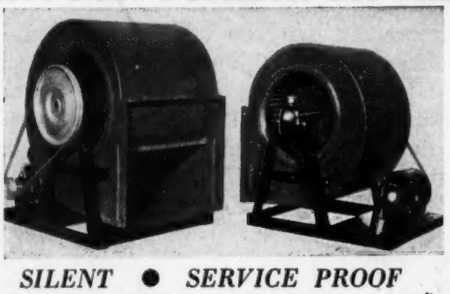
You'll find MAUREY Steel V-Pulleys designed and built for severest use in stokers and blowers.

Made for both "A" and "B" belts in all practical sizes, with heavy rolled edges and solid steel or malleable iron hubs. No DIE CAST HUBS are used in MAUREY Pulleys.

[ The MAUREY Variable Pitch Diameter Pulley permits a speed variation of as much as 30%. New construction—SOLID STEEL. Made in 4 sizes, 3¼" to 4½" O. D. Write for literature. ]

**MAUREY MANUFACTURING CORP.**
Wabash at 29th CHICAGO

**★ ★ ★ ARTCRAFT ★ ★ ★**
**HEAVY DUTY DOMESTIC BLOWERS**



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**CHICAGO STEEL FURNACE CO.,** write BLOWER DIVISION
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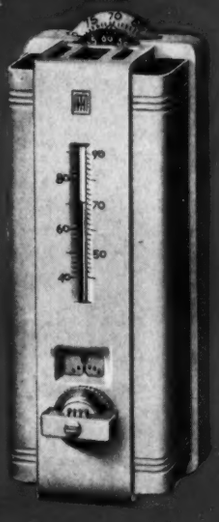
The
CLOCK THERMOSTAT
of the
GAY NINETIES

# THEN as NOW

## LOWERED NIGHT TEMPERATURE MEANT Economy



THE DA-NITE
ACRATHERM
OF 1937

EVEN before the turn of the century, when thermostats were considered a luxury instead of a distinct necessity, lowered night temperature meant fuel economy. But its a far cry from the antiquated thermostat and clock with its falling chain and weight to the handsome new Minneapolis-Honeywell Da-Nite Acratherm of today. Now, a simple twist of the fingers at night or before leaving the house lowers the temperature, which is automatically restored at the time selected. Show your customers the advantages of lowered night temperature and include the new Da-Nite Acratherm on every installation. Minneapolis-Honeywell Regulator Company, 2726 Fourth Avenue South, Minneapolis, Minnesota.

■

DEPENDABLE CONTROLS COST LESS THAN SERVICE

**MINNEAPOLIS-HONEYWELL**

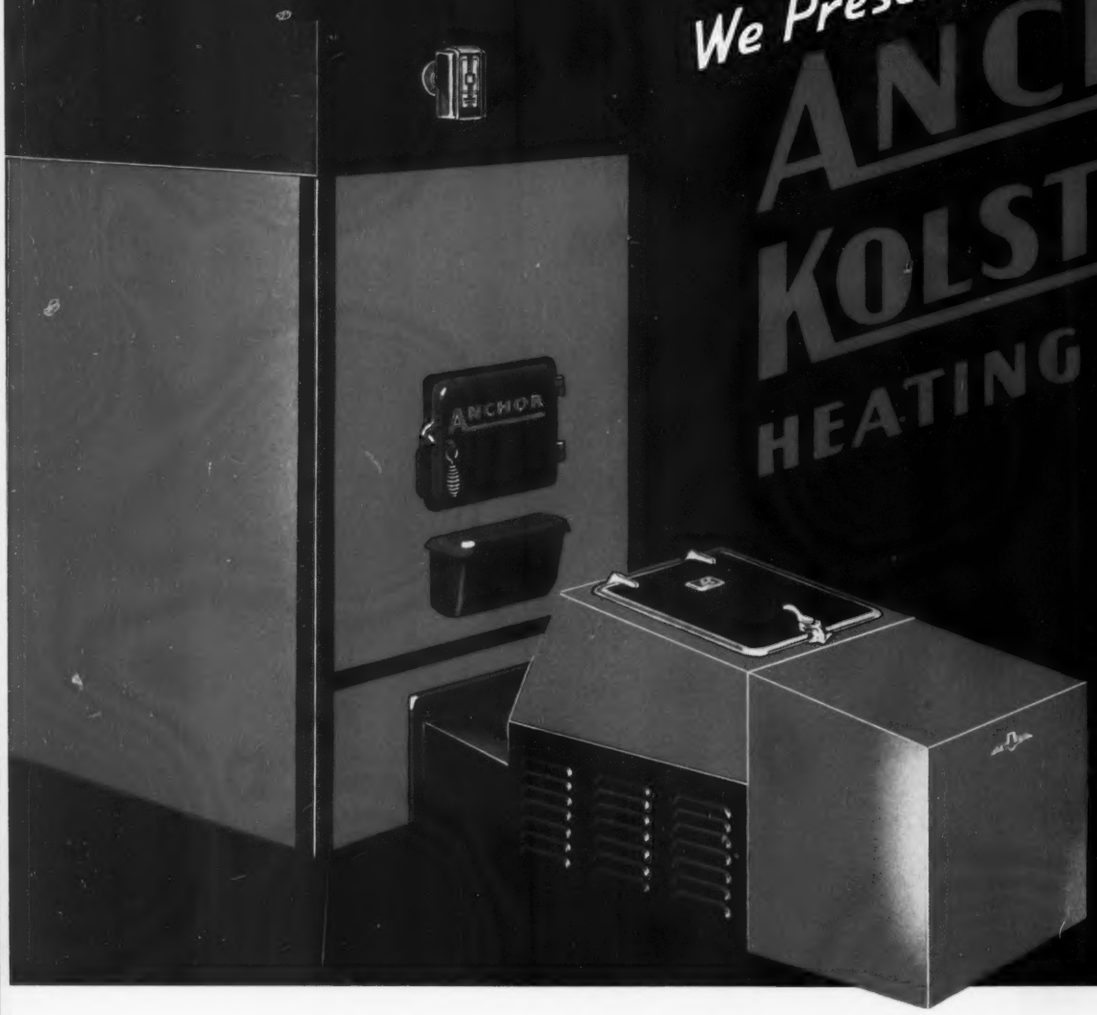
*Control Systems*

BROWN INDUSTRIAL INSTRUMENTS • NATIONAL PNEUMATIC CONTROLS

# TO DEALERS WHO ARE LOOKING FOR Big Sales and Big Profits

We Present the New

# ANCHOR KOLSTOKER HEATING SYSTEM




*A complete WARM AIR AUTOMATIC UNIT with KOLSTOKER FIRING*

## *Amazing Value Offers Tremendous Opportunity*

his complete, top-quality, warm air heating system, with automatic Kolstoker ring, at the price at which it can be sold, will demand interest and action from ny man in the market for a new heating plant. Such value just can't be ignored.

Complete unit is engineered for highest heating efficiency. Furnace has self-leaning radiator. Extra-heavy cast iron construction and asbestos lining holds niform heat. Design permits stoker firing from any side and offers four dif-erent positions for smoke-pipe connection. Stoker offers patented Anchor safe, ound-proof cabinet; famous Anchor design sectional burner head, underfeed rinciple; complete automatic control of feed and temperature.

his wonderfully attractive unit, by laboratory test, actually delivers more seful heat than any other system of equal size. Sizes and prices to meet de-ands of both small and large homes. Offers convenience, comfort, safety and conomy of automatic heat in one complete unit at a truly sensational price.

If this tremendous opportunity interests you, write us immediately. Address Department AA637.

THE ANCHOR STOVE & RANGE CO., Inc.

Established 1865—Over 72 Years of Manufacturing Heating Equipment

NEW ALBANY, INDIANA

Mr. Dealer—Sell the Anchor Kolstoker Heating System, with furnace and stoker designed by our own engineers to work together with maximum efficency—an attractive unit, produced complete by one manufacturer, with no divided responsibility—highest quality in construction and performance, at a sensational price, with satisfaction guaranteed to the buyer—and profit guaranteed to you. You'll go places and do things in the automatic heating field.

DEALERS PRICES ON COMPLETE UNIT AS LOW AS

$197.50

F. O. B. FACTORY

*Anchor Delivers Automatic Heat at its Best!*

## Salt Lake City

The Sheet Metal & Warm Air Heating Contractors Association of Salt Lake City and Vicinity meets regularly twice a month to discuss topics offered by the various members. Officers are:

President: Ray Pons.
Vice President: John Sieverts.
Secretary and Treasurer: M. L. Groo.

M. L. Groo,
Secretary.

◆

## Memphis

The Associated Sheet Metal Contractors of Memphis have been inactive since 1934 until March of this year. The heating engineer of one of the large manufacturers is a great help to the contractors and architects. The association is striving to protect the public against defective work.

W. L. Eichberg,
Secretary.

◆

## Toledo

The Toledo Sheet Metal and Roofing Contractors Association, Inc. elected the following officers at the 29th annual meeting on April 28:

President: L. B. Faunce.
Vice President: Frank Warnke.
Treasurer: Clarence Christen.
Secretary: Henry C. Bitter.

Large corporations selling air conditioning direct are "farming out" the sheet metal work.

H. C. Bitter,
Secretary.

◆

## Illinois

Du Page County Warm Air Heating and Sheet Metal Contractors Association is being revived and a bid depository has been created under a voluntary trade agreement.

M. H. Collins,
Secretary.

◆

## Albany-Troy

The officers for the Capitol District Roofing & Sheet Metal Contractors' Association are:

President: Alfred A. Kellog of James Ackroyd & Son, Albany, N. Y.
Secretary-Treasurer: James F. Keays of United Roofing Company, Albany, N. Y.

Air conditioning sales are mainly being handled through firms who are really sales setups and who in most cases have members of the association make their ducts.

James F. Keays,
Secretary.

◆

## Monaca, Pennsylvania

The Beaver Valley Sheet Metal Contractors' Association elected the following officers for 1937:

President: W. J. Crowther.
Treasurer: M. F. Lieberman.
Secretary: J. E. Harper.

The association meets once each month on the fourth Tuesday at the different shops. The host serves refreshments.

J. E. Harper,
Secretary.

## Peru, Illinois

The Sheet Metal Contractors Association of LaSalle reports a few meetings with the local union men where all mutual differences such as wages and working conditions for 1937 have been settled.

Charles G. Soedler,
Secretary.

◆

## Dayton

The Sheet Metal, Furnace and Roofing Contractors Association has been holding regular meetings twice a month, increasing the membership and laying plans for the present and future. The furnace installation code is receiving attention.

R. E. Barrett,
Secretary.

◆

## South Carolina

R. H. Evans, formerly secretary-treasurer of the now inactive Tri-State Association of Sheet Metal Contractors, believes that an active association would be of much value to members at the present time, especially with so much legislative action being taken.

◆

## Akron, Ohio

The Warm Air Heating, Sheet Metal and Roofing Association of Akron and Vicinity is planning to set up an apprentice program for the sheet metal industry as soon as the program for the plumbing industry is under way.

A. W. Dickson,
Secretary.

◆

## St. Louis

The jobbers of St. Louis have recently organized as the St. Louis Heating and Sheet Metal Wholesalers' Association, the main purpose of which is the interest of the air conditioning and sheet metal group being supplied by these jobbers. An educational program is the first major project of the association. Eugene Farris is chairman, Wm. C. Werley is vice-chairman, and Oscar P. Brauer of the A. G. Brauer Supply Co. is secretary.

Oscar P. Brauer,
Secretary.

◆

## A. S. of A. E.

General plans for the 31st annual meeting of the American Society of Agricultural Engineers at the University of Illinois on June 21, 22 and 23 have been arranged.

Relations with the Society for the promotion of agricultural engineering work are to be discussed in the opening program devoted to education. The Farm Structures Division will feature farm housing; and the agricultural engineer's responsibility in the promotion of better farm buildings.

Tuesday's program includes "Use of Insulation under High Humidity Conditions." Thursday's program covers "Heating, Ventilating and Humidity Control in Tobacco-Curing Barns," "Natural and Artificial Curing of Forage Crops," and "The Drying of Hay and Other Farm Crops."

## Wisconsin

The Board of Directors of the Master Sheet Metal, Heating, Ventilating & Air Conditioning Contractors Association, Inc., of Wisconsin met at Veteran's Hall, 330 Main St., Racine, on May 5.

M. A. Johnson of Colonial Heating, Madison, was added to the membership.

A motion was passed to contact the members of the Legislative Committee regarding the State general orders on fumes, ducts, etc. (code) and members Hielscher, Goethel and Holming were added to the regular committee—some of the evils being the riveting of pipes, elongated elbows, etc., which are considered impractical and detrimental to the industry.

Member Hielscher presented for consideration that units for heating with all the necessary equipment and sheet metal work should be classified and specified under the sheet metal contract, believing that the State Association should go on record and take some action.

Labor conditions, C. I. O. and A. F. L. were discussed.

Officers of the State Association are:

President: R. F. Gehrke, Shawano.
First Vice President: H. J. Ortwig, Racine.
Second Vice President: R. H. Fetting, Milwaukee.
Third Vice President: John Wallig, Kenosha.
Fourth Vice President: Otto Ziebarth, Madison.
Fifth Vice President: Frank Kramer, Milwaukee.
Secretary: Paul L. Biersach, Milwaukee.
Treasurer: Alfred C. Goethel, Milwaukee.
Sergeant at Arms: Walter C. Arndt, Milwaukee.

Officers of the Milwaukee association are:

President: A. A. Walters.
Vice President: F. Kramer.
Secretary: W. A. Schmidt.
Treasurer: Walter Marth.
Executive Secretary: Paul L. Biersach.

Paul L. Biersach,
Secretary.

## St. Louis

The Associated Sheet Metal, Air Conditioning and Heating Contractors of St. Louis, Inc., held a most optimistic and enthusiastic meeting at the Claridge Hotel, on Monday, May 3rd, with more than one hundred present. A talk was given by E. Farris and G. W. Bendorf, of the Manufacturers and Jobbers group to assist and help to support the sheet metal and furnace installer by having a series of seventeen lessons on heating and salesmanship, and after this a series on general sheet metal work.

A motion was made to have two meetings a month instead of one—the meetings to be held on the second and fourth Mondays of each month, and all sheet metal men are invited to attend.

At the meeting on Monday, May 10th, a report was made on the revision of the warm air heating code now taking place.

The meeting adjourned with 14 new members added.

B. Kolbenschlag,
Treasurer.

## Chicago

The regular meeting of the Furnace & Sheet Metal Institute was held Thursday night, May 20th, Louis Drehobl presiding. Walter Abele talked on Air Conditioning, and gave a resume of warm air heating during the past two decades. Sales tax questions were cleared up for the members by Peter Rish, and the legislative committee reported on an attempt to install composition ducts in the Jefferson Hotel in St. Louis, which was finally defeated by legislation requiring that all ducts have a metal base.

## Milwaukee

The Milwaukee Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc., held their regular monthly meeting at Guild Hall, Republican Hotel, Milwaukee, on May 3.

President A. A. Walters called the meeting to order at 8:30 p. m.

A charge was made that a new municipal code specified air cell covering for air stacks and discussion brought forth that steps should be taken to get an effective code in operation in the municipality. Member Fetting volunteered to see the Building Inspector and other associations and report.

## A. S. H. & V. E.

The tentative program for the June 23-26 meeting of the American Society of Heating & Ventilating Engineers, 51 Madison Avenue, New York City, has been released.

Some of the interesting papers are:

Degree Days for Summer Air Conditioning, by A. D. Marstons.

Study of Summer Cooling in the Research Residence Using Water at Temperatures of 52 and 46 deg. F., by A. P. Kratz, S. Konzo and E. L. Broderick.

Ventilation Requirements, Part II, by C. P. Yaglou and W. N. Witheridge.

Report of A. S. H. V. E.-A. S. R. E. Committee on National Standards for Air Conditioning Applications, by L. A. Harding, Chairman.

Simplified Method of Testing and Rating Air Cleaning Devices, by Arthur Nutting.

Direct Reading Effective Temperature Indicator, by J. R. Parsons.

A. V. Hutchinson,
Secretary.

## St. Louis

The Associated Sheet Metal, Air Conditioning and Heating Contractors of St. Louis has adopted the following program to begin with their May 24 meeting, held at the Claridge Hotel.

**Education for the Dealer**

A-1
1. Education of sheet metal operator on standard code for gravity warm air furnace
2. "Why" the standard code
3. Authority for standard code
4. Introduction of code proper
5. Dissecting the code
6. Summary, questionnaire, and answers on standard code problems and practices to be reviewed prior to next tinners' meeting

A-2
1. Review of questionnaire
2. Adapting the code to a simple type bungalow residence
3. Submit another questionnaire and answers on location of registers, grilles, and return air systems

A-3
1. Review of questionnaire and answers
2. Correcting erroneous impressions formed by sheet metal men in interpreting the standard code
3. Value of return air on gravity jobs
4. Sizing leader pipe area to compensate for unheated spaces such as hallways, etc.
5. Submitting of examination for the installation of a standard code gravity job in blue print form

A-4
1. Discussion of the examination
2. Calling for bids at random on the examination job
3. Taking off materials for the examination installation
4. Estimating the labor by operations on examination job
5. Questions and answers on taking off material, and shop and field labor for installation job

A-5
1. Review of questions and answers.
2. Setting a furnace
3. Chimney troubles and corrections
4. Common diseases and failures of warm air installations
5. What causes sick furnaces and how to repair them
6. Questions and answers.

The above subjects cover lessons in order named which is expected to consume five evenings.

Lessons A-6 to A-15 have been planned only up to the point of arriving at the topic of each lesson.

A-6 Converting gravity jobs to forced air
A-7 Humidification and filtering in heating plant
A-8 Mechanical code for forced air heating (2 lessons on this)
A-9 Application of code to a 2-story residence
A-10 Examination on installation of forced air heating
A-11 Sickness and cures of a forced air heating plant
A-12 Automatic heating, oil and gas and stokers
A-13 Controls for forced air and automatic heating systems
A-14 Invite building and loan secretaries to a joint session on the value of a heating plant to the resale value of a residence
A-15 Introduction of accounting systems, for sheet metal shops (2 lessons on this subject)

Lessons to be worked up, to follow above:
Guttering and downspouts
Cornice work; duct work; deck work
Special sheet metal jobs.

Oscar P. Brauer,
Secretary.

# News Items . . . . . .

## Capital City Spends $7,000 for Furnaces

Permits for furnace installations totaling more than $7,000 were issued recently by Building Inspector Schwartz of Jefferson City, Missouri. Coal heating units led the list. The highest-priced installation was an air conditioning-heating unit installed by H. J. Broegging at his home, 25 West Dunklin Street.

Other installations were: Mrs. M. Allen, air conditioning, 710 Lafayette Street; Ed. Schwartz, air conditioning, Walinko Place.

◆

## Active Memphis Dealers

North Main Street in the older business section of Memphis, Tennessee, is the home of three active sheet metal firms. A. Walter at 368 N. Main features sheet metal roofing and furnace work; R. Sauter, 371 N. Main also does sheet metal and roofing work. Ford Blow Pipe and Manufacturing Co., 400 N. Main, does a large line of blow pipe work for cotton, cottonseed oil and woodworking plants and also some other lines of sheet metal work.

◆

## Business View of Housing

In an effort to aid in the development of a plan, which will bring about the solution of the housing problem by private enterprise on an economic basis, rather than through the wholesale entrance of the National, State and local governments into the housing field, The Merchants' Association of New York has, under the title "A Business View of the Housing Problem," published a report outlining the policies which it believes should be followed by various legislative agencies. The report is in effect a plea for "economic" housing for the masses.

◆

## Barn Ventilation for Tobacco Curing

A short item in the Paris (Kentucky) *Post Intelligencer* by M. F. Williams, recently called attention to the need for proper barn ventilation in the successful curing of tobacco.

The author states that the barn should be extremely tight and provided with proper ventilation. There should be full ridge ventilators in the roof, except the barn that is covered with boards. A system of ventilation should be provided around the bottom in order to cause a rapid passage of air over the surface of the leaf. The weather may be such that it will be necessary to keep the ventilators closed, or it may be necessary that they be left open while the tobacco is coloring. This will depend altogether on the weather, and the grower should be able to make his own weather conditions in the barn if he is to receive top prices for his tobacco.

◆

## Social Security Ruling

To insure eligible workers their full rights to benefits under the unemployment compensation provisions of the Social Security Act, the Social Security Board ruled on January 25, 1937, that wage earners shall not be required to sign "serverance" reports. This is a form on which the employer reports to his State unemployment compensation administration, when any employe subject to the law leaves his employ, giving the reasons therefor.

The purport of this ruling, which now becomes effective in the states having unemployment compensation laws approved by the Board, will be to protect workers from being virtually forced into agreeing to postponement or possible loss of their unemployment compensation benefits.

Taking the stand that requirements to force employes to sign severance reports might lead to serious abuses, the Board ruled that such requirements would be held an infringement of section 303 (a) (1) of the Social Security Act.

## Institute Plans Addition

The Refrigeration and Air Conditioning Institute, 2150 Lawrence Avenue, Chicago, has completed plans for the construction of a new building unit of the most modern type at an estimated cost of $50,000.

◆

## Sheet Distributors Annual Meeting

THE twenty-sixth annual meeting of the National Association of Sheet Metal Distributors was held at the Hotel Cleveland, Cleveland, Ohio, on May 5 and 6.

A. W. Howe, president, opened the meeting with an optimistic talk on wholesale distributing conditions in general. E. L. Shaner, editor of *Steel*, discussed "Significant Trends in the Distribution of Finished Steel"—statistics presented showed the growth in the amount of steel used in various industries. Flat rolled sheets made up 50 percent of the total mill production in 1936, as compared with only 11 percent in 1887, Mr. Shaner said.

After considerable discussion of how the mills are handling the stamping of prime sheets, as requested in the October, 1936, meeting, Secretary Fernley was requested to again inform the mills that it is the desire of the sheet steel distributors that all prime sheets be stenciled prime, regardless of whether or not the jobber makes the request when placing orders. Some mills are stenciling all sheets, regardless of the jobber's demand. Mill representatives present assured distributors that their companies would comply.

Vice-President Robert Lyon opened the afternoon session. F. H. Ramage of the Republic Steel Corporation talked on "Possibilities in Salesmanship Training," defining salesmanship as "The gentle art of letting the customer have your way."

Extras for L. C. L. shipments came in for considerable discussion after the report of the galvanized and black sheet and corrugated roofing committee.

Establishment of more stable prices and sales policies was requested of manufacturers of prepared roofing.

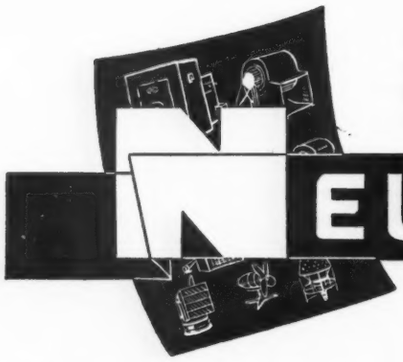
Election of officers on Thursday morning resulted as follows:

President: A. W. Howe, The J. M. & L. A. Osborn Co., Cleveland.
Vice-President: Robert H. Lyon, Lyon-Conklin & Co., Inc., Baltimore.
2nd Vice-President: A. J. Becker, Ohio Valley Hardware & Roofing, Evansville, Indiana.
Secretary-Treasurer: George A. Fernley, Philadelphia.
Assistant Secretary-Treasurer: Percy F. Hord, Philadelphia.
Executive Committee:
1935-1938—Eugene Foley, Bayonne Steel Products Co., Newark, N. J.; J. M. Burbank, Farwell-Ozmun-Kirk & Co., St. Paul. 1934-1937—E. H. Hoffeld, The Ferdinand Dieckmann Co., Cincinnati; H. B. Thompson, Conklin Tin Plate & Metal Co., Atlanta. 1937-1938—Joseph Stelwagon, Stelwagon Manufacturing Co., Philadelphia; George O. M. Johnston, McClure-Johnston Co., Pittsburgh.
Advisory Board:
Composed of former presidents.
F. O. Schoedinger, Columbus, Ohio.

Resolutions of sorrow were passed on the death of member Frank McNieve.

Congressman Patman talked on the Robinson-Patman bill, which was followed by questions and discussion from the floor.

The annual dinner was held on Wednesday evening in the empire room of the Hotel Cleveland, with William Gannon Ross as guest speaker.



**For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 108 and mail to us. Complete information will be forwarded.**

● **Indicates product not listed in 1936 Directory**

△ **Indicates product and manufacturer not listed in 1937 Directory**

# NEW PRODUCTS

## 72—Twin Zephyr Humidifier

Maid-O-Mist, Inc., 180 N. Wacker Drive, Chicago, is now marketing the Twin Zephyr Automatic Humidifier, featuring two bronze humidifying pans, each having ten times the heat transmission efficiency of cast or sheet iron

of the same thickness. Each pan has more than 350 sq. in. of heating area and is equipped with patented wings to plane the air over the water. It has an adjustable hood that fits the slope of any furnace. A patented, self-locking overflow plate permits the raising of one end of the pan to reduce the evaporating capacity in extreme cold weather to prevent over-saturation.

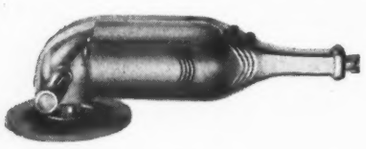
In the twin unit, each pan may be raised or lowered independent of the other. It is recommended for large warm-air installations, especially gas-fired furnaces, both gravity or forced air. The twin unit is fed by a new type Water-Boy located away from the furnace to avoid corrosion. Equipment includes saddle valve, copper tubing and fittings for quick connection.

◆

## ● 73—Skilsaw Disc Sanders

Skilsaw, Inc., of Chicago announces two models of Skilsaw 7-in. disc sanders—one for heavy duty and one for constant production service.

Comfortable grip handles assure



complete control under heavy sanding loads. An efficient air-filter protects the commutator and motor from abrasive dust and dirt. Ventilating ports blow the dust away from the operator.

Skilsaw 7-in. disc sanders are used for removing weld marks, rust and dirt from tanks, vats, etc., for sanding metals, smoothing steel and iron castings, beams and columns.

◆

## 74—Steel Air Conditioner

The Fox Furnace Company, Elyria, Ohio, announces a new Series 5500 Sunbeam air-conditioning unit with steel heating element, designed for burning coal or oil.

The heating element of this new series is made of boiler plate steel with seams both riveted and welded to assure leak-proof operation. Casings are attractively finished in red crystalline baked enamel with black trim.

The coal burning model is equipped with duplex grates of the latest design and fire-brick lining to protect the walls of the fire section. The stoker fired model has an insulated fire door with a glass covered observation port.

The two oil burning models, rotary type and gun type, will accommodate any standard make of oil burner.

This series is substantially lower in price than other Sunbeam Steel Air Conditioning Units.

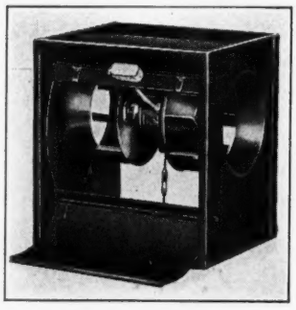
◆

## △ ● 75—Bright Metal Protection

Hayden F. White & Co., 1740 E. 12th St., Cleveland, is offering Protex for the protection of stainless, aluminum or other plated metals or high-finish cold rolled or highly polished metals during shearing, punching, forming or bar folding.

Protex is brushed on and dusted with powdered mica or soapstone, or kraft paper can be laid over the Protex.

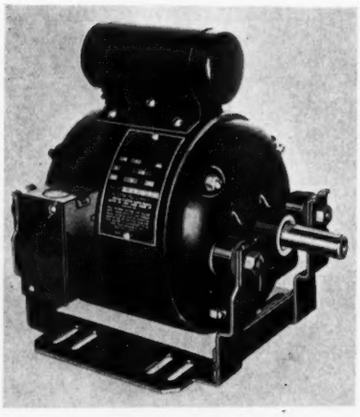
## 76—Skeleton Type Blower



The Emerson Electric Manufacturing Company, St. Louis, Missouri, now has skeleton blowers available in four sizes for those who prefer to build their own blower housings, with capacities ranging from 1400 to 4950 c.f.m. free delivery. The blower wheels are mounted directly on the motor shaft, and insulated with rubber. An eight-speed control unit on the 17-D, 30-D, and 50-A types provides perfect balancing of the air circulation by being able to select any three of the eight speeds available.

◆

## 77—New Motor



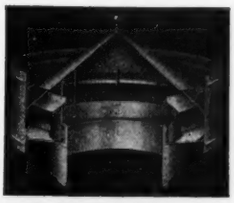
Peerless Electric Company, of Warren, Ohio, announces a two speed, capacitor start induction run motor. This is a resilient-mounted motor furnished in ratings from one-sixth to one-half horsepower. Speed changes are obtained by a simple three-point switch or automatic control, providing speed control for belted blowers, fans and similar installations. High speed is 1750 rpm; low speed 1150 or 850.

# New Products . . . . . .

**For your convenience in obtaining information regarding these items, use the coupon on page 108**

## 78—Standard Gravity Ventilator

The Burt Manufacturing Company, Akron, Ohio, announces the Burt Standard gravity ventilator and a full line of dampers for use in all Burt ventilators.



In this Standard gravity ventilator, the company states that the best features of previous units have been combined with the addition of the newly developed Burt lower louvre, thereby securing a roof ventilator of remarkable air moving ability.

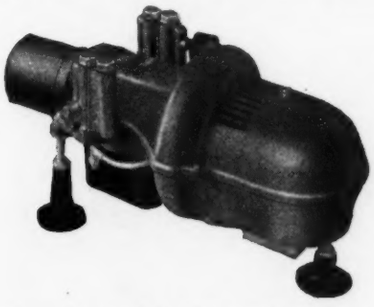
Standard construction material is prime open hearth galvanized steel. Other metals are optional.

Burt Louvre dampers are offered by this company as the finest means of controlling air flow. Multibladed, the blades on one half open up while those on the other half open down. The center blade is double width and its edges are connected to adjacent blades by clips and bars.

◆

## 79—New Chalmers Burners

The Chalmers Oil Burner Company, 1234 Central Avenue, N. E., Minneapolis, has produced two new burners for the 1937 business. These new designs permit easier adjustment of burn-



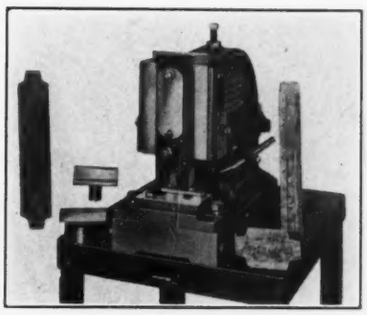
ers to the special space requirements of unit jackets, and the extra length required for deep warm air furnaces.

Chalmers burners are approved by the Underwriters' Laboratories, by the New York City Board of Standards and Appeals and carry the approval of several states requiring special review of oil burning equipment and also of a number of foreign governments with similar requirements. Chalmers burners may be legally installed in any city of the United States, they say.

## 80—Drive Cleat Notcher

The Whitney Metal Tool Company, Rockford, Illinois, announces the development of a special notching punch and die to be used on their standard No. 28 Kick Press for reducing the cost of producing drive cleats (also called "drive slips") which are used in fastening duct sections together.

Punch and die sets of the same general construction are available for the



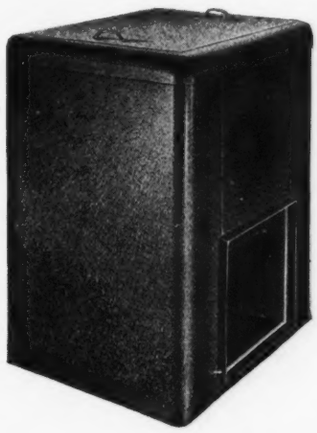
various types of seams which are included in common practice.

◆

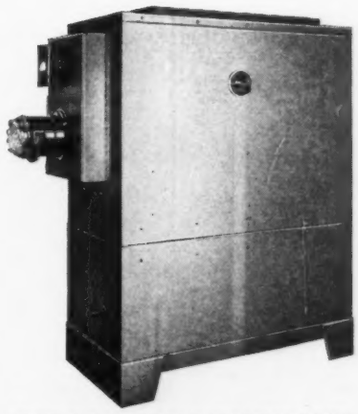
## 81—New Niteaire Blower

The Law Blower Company, Dayton, Ohio, has designed and perfected a new and improved Niteair attic blower.

The Niteair Blower, encased in a cabinet of unusual design, operates at a lower speed with maximum efficiency, reduces operating noise and vibration and operates efficiently against static pressure encountered in most installations, they say. Specially designed rubber cradles cushion the en-



tire mechanism. Dynamically balanced centrifugal type blower wheel mounted in self-aligning, self-lubricating bearings, and large removable cabinet top for complete accessibility are other features.



TYPE "X" AIR CONDITIONING UNIT

## 82—Air Conditioning Units

The Herman Nelson Corporation, Moline, Illinois, has just introduced two new units designed to provide both winter and summer air conditioning, in combination or separately. These units are manufactured in two distinct types, the type "X" for commercial and large residential application and type "Y" for domestic use.

The standard type "X" model is designed for floor mounting, but can be had for ceiling suspension as well. It is made in three sizes to provide a heating capacity ranging from 139,000 to 346,000 Btu per hour, a cooling capacity from 4 to 15 tons and an air circulation of 2,000 to 5,550 cubic feet per minute. Both floor and ceiling models are made up of two sections. One consists of a dehumidifier and drain pan and the other contains the heating coil and fan. Finished in corrosion resistant gray baked enamel.

The type "Y" unit is designed primarily for domestic or smaller applications of year around air conditioning. To save space, this unit is made in the ceiling mounted type only. It is made in two sizes to provide from 65,500 to 147,750 Btu per hour; two and three-ton cooling with 1,100 to 1,650 cubic feet per minute circulation of air. Finished in opalescent brown baked enamel.

In both units humidification is spray type, provided by Kant Klog spray heads in dehumidifier base.

◆

## △ 83—Electrol Air

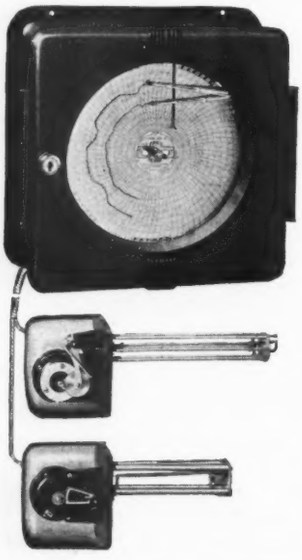
Associated Air Conditioning Corp., 3339 Lindell, St. Louis, Mo., has developed an air-conditioning furnace with induced draft making the system independent of natural draft and giving an efficient and economical firing with either oil or gas. They claim an overall efficiency of 80 per cent in the average installation. A 4-page folder illustrates and describes the Electrol-Air which heats, humidifies, ventilates, filters and circulates the air in winter. In summer it will ventilate, filter and circulate the cool air from the basement, and by the addition of cooling coils in a space provided in the cabinet, automatic cooling and dehumidification is obtained. Heating capacity is 100,000 to 300,000 Btu. per hour.

# New Products . . . . . .

**For your convenience in obtaining information regarding these items, use the coupon on page 108**

## 84—Humidity-Temperature

Julien P. Friez & Sons, Inc., Baltimore, Maryland, announces an entirely new range of round chart recording instruments for relative humidity and temperature.



Recorders for either daily or weekly operation are available. The standard instrument has an electric clock movement, but spring wound clocks are available on special order. All recorders will handle the complete relative humidity range from 0 to 100 percent.

One type of this new recorder has a new and exclusive Friez feature in that it transmits relative humidity direct from any remote distance. The record shows the relative humidity and temperature condition in a space where the sensitive elements are located, while the recorder itself may be located at any suitable location.

◆

## △ 85—Refractory Maintenance

Chicago Fire Brick Company, 1467 Elston Avenue, Chicago, Illinois, is introducing Super Thermo Stucco, a new method of refractory maintenance which they claim saves time, labor and material and cuts heat losses.

Super Thermo Stucco is used in boiler furnaces, drop forge furnaces and billet furnaces, in annealing ovens, in tar stills, in varnish furnaces and enameling furnaces, coke ovens, glass tanks, brass furnaces. It is an air or heat-setting, high fusion, strong bonding coating mix which may be trowelled or sprayed in thick coatings over any fire clay refractory surface, hot or cold, porous or glazed, and which under firing becomes an integral part of such refractory.

## 86—Syox Forced Air Registers

Symonds Register Division, Liberty Foundry Company, 7600 Vulcan Street, St. Louis, is distributing Catalog No. 37 covering their air conditioning registers and grilles, and featuring the Syox register for forced air work.

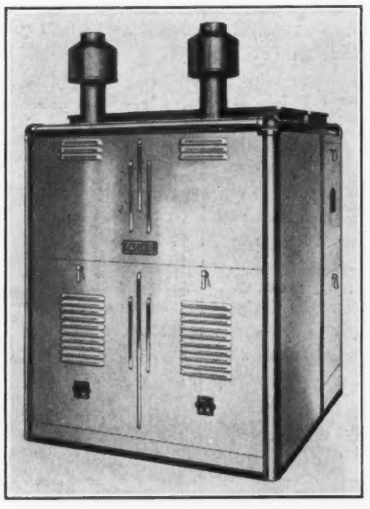
The Syox register combines in one unit the stack head, setting frame, an approved leak-proof plaster lock, a volume control and shut-off damper, diffusers, register face, and knob for operating damper on face of register.

Complete balancing, they claim, may be done at the face of the register without the use of quadrants. Valve can be locked in position by use of an ordinary nut on bolt under operating knob.

◆

## 87—Streamlined Blower Furnace

Pacific Gas Radiator Company of Los Angeles and Huntington Park, Calif., announces a new Pacific forced-air streamlined deluxe blower furnace.

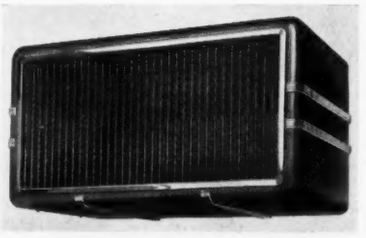


It offers beauty of design with rich and lustrous chrome trimming, and is finished in a variety of colors that harmonizes with any surroundings.

Pacific multi-tubular burners, famous for efficiency in operation and trouble-free service, are standard equipment. There are no adjustable air-mixers. Each individual burner unit is a complete blue-flame burner drawing its own individual air supply, mixed to the exact proportion for complete combustion.

Pacific all-steel round heating element is used and is designed to eliminate expansion and contraction, strains and buckling noises.

It is made in a range of sizes of heating capacities from 75,000 Btu. to 270,000 Btu. Summer cooling equipment may be added.



## 88—Unit Comfort Coolers

General Refrigeration Sales Company, Beloit, Wisconsin, announces a new line of Unit comfort coolers, designed particularly for installation as single units in small rooms or in multiple units for larger rooms where the construction of duct work is either undesirable or impossible.

There are two styles, each with three models arranged for Freon, Methyl Chloride and cold water.

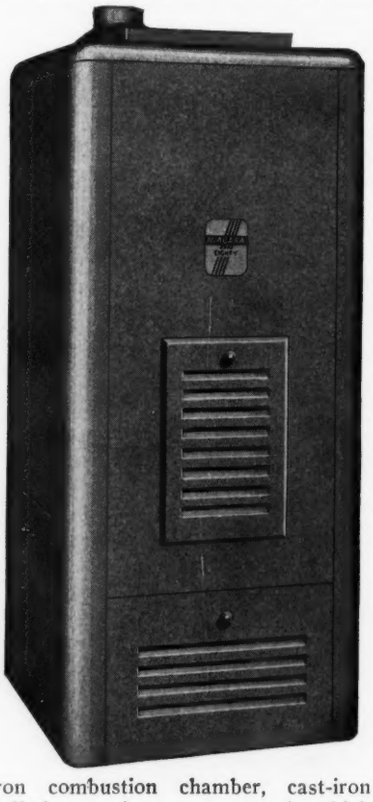
◆

## 89—New Niagara "Eighty"

The Forest City Foundries Company, Cleveland, Ohio, announces the New Niagara "80 AC," a gas-fired winter air-conditioning unit.

The Niagara "80 AC" has been especially designed for small homes of four or five rooms, with or without basement.

The designing skill is evident in the compact assembly of the blower, cast-



iron combustion chamber, cast-iron radiating sections, and controls which form a unit occupying the small floor area of only six and a half square feet! The base of the Niagara "80 AC" measures but 26 x 37 in.

Chateau green finish, used on the larger Niagara models, is employed on the Niagara "80 AC."

**You have the men, the tools, and the experience ... why not go after this profitable business?...**

Copper roofs are giving the sheet metal trade a new source of profit... and the trend indicates better things ahead. Already, the new Anaconda *Economy* Copper Roofing has been installed in many residential sections throughout the country.

And why not? Here's a roof with sales-appeal, with eye-appeal; a roof of top-quality, designed *and priced* for use on homes. Architects like it. The public admires it. And Anaconda's national advertising is behind it, steadily creating greater interest and acceptance for this fine roof.

We are saying in our ads: "*Competent sheet metal craftsmen everywhere* are equipped to install Anaconda *Economy* Copper Roofing." Why not go after this profitable business? Become known as "headquarters" for Anaconda Copper work in your locality. Let us send you additional information. 37230

*This house was recently built in the Fox Meadow section of Scarsdale, Westchester County, New York, by House & Garden Magazine. Julius Gregory, Architect. George Bickhardt, roofing and sheet metal contractor. You can sell copper roofs to homeowners in your locality.*

ANACONDA
from mine to consumer

Anaconda Copper

THE AMERICAN BRASS COMPANY · GENERAL OFFICES: WATERBURY, CONNECTICUT

*Offices and Agencies in Principal Cities* · In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ontario

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This material applied to Stainless, Aluminum, all plated metals, any High Finish Cold Rolled or highly polished metals will stop scratching in these metals even with severe forming such as in:

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Shearing
Punching
Hand Shearing
Forming on Brakes

PROTEX is easy to use. Just brush on and dust with powdered mica, soapstone; or kraft paper can be laid over the PROTEX and then form or shear without any danger to the finish, then peel off the PROTEX.

We'll be glad to send a sample and complete instructions together with prices. Fill out the coupon and attach to your business letterhead and mail to us.

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Haydn F. White & Co.,
1740 E. 12th St., Cleveland, Ohio

Please send sample of PROTEX, with instructions for use and prices.

Name .....

Address .....

City and State .....

# With the Manufacturers . .

## Clark Joins Randall Graphite

M. E. Clark has been appointed sales manager of Randall Graphite Products Corporation of Chicago, manufacturers of Randall graphite bronze bushings and Randall pillow blocks.

◆

## J. G. Henninger

J. G. Henninger, 75, died on May 7 of pneumonia, after 32 years of service with the J. M. and L. A. Osborn Co., Cleveland. Mr. Henninger was well known among sheet metal men in Michigan, Ohio, along the Ohio River towns, Iowa, Nebraska and Denver.

◆

## Lukens Makes Lower Price

Lukens Steel Company, Coatesville, Pa., announces a new and lower base price per pound for Inconel-Clad Steel. A new list of standard extras was also issued. Inconel-Clad Steel is a bi-metal steel plate consisting of a light layer of Inconel bonded to a heavier layer of ordinary steel. It is an alloy of nickel, chromium and iron. Its composition is approximately 78 to 80 per cent nickel, 12 to 14 per cent chromium, and 6 to 8 per cent iron.

◆

## Interstate Moves to Larger Quarters

The Interstate Machinery Co., Inc., Chicago, dealers in new and rebuilt sheet metal machinery, is now located at 107 South Clinton Street. The new quarters provide materially increased space with more adequate facilities to serve.

Interstate also operates a machinery and rebuilding service in conjunction with its machine and tool sales work, and for this purpose has a warehouse comprising of over 75,000 square feet, or almost an entire city block, with switch tracks and cranes.

◆

## Warm Air Short Course

The Chandler Company, Cedar Rapids, Iowa, conducted a warm air short course on April 21 and 22.

The program included an address of welcome by C. R. Chandler, president and A. Taylor of the Cedar Rapids Chamber of Commerce; a lecture on the progress in warm air heating by E. A. Chamberlin, Engineer; discussion of new Chandler models by E. B. Hauser, Sales Manager; explanation of the HealthMaster Heating Manual by Wayne A. Welch; figuring a gravity warm air job, forced air jobs and conversion jobs by L. O. Hale; furnace controls by Mr. Werner of Barber-Colman Co.; Chandler time payment plan; residential air cooling; Autocrat oil burners, by C. Fontana; Cole draft regulators, by S. H. Burt; inspection of exhibits; drawing of grand prize; inspection of plant; a banquet, floor show and stag party.

◆

## Harry E. Kerr

Harry E. Kerr, 57, for 19 years president of the Barber Gas Burner Company, Cleveland, Ohio, died May 7 in the Anglo-American Hospital in Havana, Cuba.

Mr. Kerr was born in Oshawa, Ontario, Canada, and is survived by his mother, Susan E. Kerr of Windsor, Ontario, Canada; three brothers, Arthur, Edward and Garnet, and one daughter, Dorothy E. Manuel of Shaker Heights, Cleveland, Ohio.

He organized the Cleveland Gas Burner & Appliance Company in 1918, manufacturing the Barber Gas Burner, which company was reorganized under the name of the Barber Gas Burner Company in 1930. He was probably the most widely known individual in the gas appliance manufacturing field, being an active member of the Manufacturers' Division of the American Gas Association and was the pioneer in developing conversion gas burners and their application to coal-fired design heating appliances.

The company will continue operations without any change in personnel.

# SIGN MANUFACTURER "DOUBLES UP" ON UNISHEAR

Here's further proof that there's no tool like the Unishear! Two model 0-54 Unishears are cutting complex patterns — curves and angles — from 16 gauge enameling iron. See the finished work on the floor. The edges are smooth. The sheets lie flat, undistorted. At 2400 shear cuts per minute, Unishear cuts as the work is fed.

Model "0" stationary Unishears cut sheets as large as 96" x 48". Cut holes or shapes inside the sheet, starting at any point, without "starting holes" or cutting in from the edge. Will cut curves to less than ¼" radius. Other stationary Unishears cut up to ¼" boiler plate, as you feed.

"Mighty Midget", shown at the right, is one of the three sizes of portable Unishears, "electrically driven hand shears". In the shop or on the job, it cuts up to 18 gauge hot rolled steel. Other models with capacities of 16 or 14 gauge hot rolled steel, other materials in proportion.

*"Mighty Midget"*

*Ask for a free demonstration, or write for Catalog 64M.*

STANLEY ELECTRIC TOOL DIVISION
*The Stanley Works*
*131 Elm Street, New Britain, Conn.*

STANLEY UNISHEARS
THE ELECTRICALLY DRIVEN HAND SHEARS

# "OUR BUSINESS Has Picked Up"

## —"thanks to our LINCOLN WELDER"

"Up until 10 months ago, our Accurate Revolving Ventilators were riveted. Changeover to welding with our Lincoln Welder reduced labor and material costs considerably.

"The first of the year, we had to raise prices slightly on all our products—but because of the great savings with our Lincoln Welder, we were able to keep the price much lower than if we were using the old methods.

"Thus, by making possible a better product at a lower price, our Lincoln Welder has helped make our business prosper."

R. H. GUENTHER, *Gen. Mgr.*
Accurate Mfg. Works, Chicago, Ill.

The Lincoln Welder can show you, too, new ways to make profits. It's always handy—goes to work at the press of a button and will weld all day for just a few dimes. The cost is as little as $200, and easy terms can be arranged.

**THE LINCOLN ELECTRIC COMPANY**
*Largest Manufacturers of Arc Welding Equipment in the World*

**MAIL THIS COUPON TODAY**
**THE LINCOLN ELECTRIC COMPANY**
**Dept. EE-365, Cleveland, Ohio**

Please send details about the Lincoln Welders for sheet metal shops.

Name .....
Company .....
Address .....
City ..... State .....

## Artificial Patina

(*Continued from page* 34)

containing 85% or over of copper exposed to the atmosphere it may be obtained by rubbing the copper with cotton waste soaked in boiled linseed oil. This coating will as time goes on turn the copper a dark brown and will adhere to the copper surface.

(b) Another method more suitable for small articles is to thoroughly clean the surface and then use a solution of

1 gallon water—hot
2 ounces potassium sulfuret (liver of sulphur)
3 ounces caustic soda

Use solution hot, say at 160 or 180 degrees F.

It is possible to purchase solutions made up to produce similar effects.

Tones develop on copper in the following order —brownish, reddish bronze, bluish black, and black. Remove when desired tone is reached and wash thoroughly.

Scouring with pumice and water or oil helps to bring out certain tones. Scratch brushing with a brass wire scratch brush is another means of developing additional tones.

◆

## Fort Wayne Ordinance

(*Continued from page* 24)

### Term of Office

d. This Inspector shall hold office until twelve o'clock noon of the first Monday in January in the year 1939; and thereafter the term of office of such Inspector shall be four years, beginning at twelve o'clock noon on the first Monday in January, and until his successor is appointed and qualified.

f. The Board of Safety shall have the power to appoint, with the approval of the Board of Health, one or more Assistant Inspectors of Heating and Sheet Metal Work, as may be necessary, whose term of employment shall be at the pleasure of the Board of Safety and whose pay shall be fixed by said Board, not to exceed $175.00 per month. Such assistant or assistants shall be well trained in the duties of their office and shall work under the direction of such Inspector.

### Duties of Inspector

g. The duties of such Inspector shall be to act as chairman of the Examining Board; to examine and approve when correct, all plans and specifications for the performance of any work governed by this ordinance, to see that they conform to the provisions of this ordinance and to the latest and most approved standard for such work; and to point out in what respect such plans or specifications are defective or in violation of this ordinance; to inspect all work in the City of Fort Wayne for which permits are required under this ordinance and to see that all such work is performed in accordance with the provisions hereof; to stop any work being done in violation of the terms hereof and to post "Stop Work" signs therefor; to order any such work removed or corrected to conform herewith, to issue certificates of approval on satisfactory completion of projects; provided, however, that no "Stop Work" order so posted shall affect work not governed by this ordinance except where the progress of any such work would interfere with inspection of work governed by this ordinance. He and the Assistant Inspectors shall have the right to enter upon any premises or into any building or enclosure where he has reasonable cause to believe work is being or has been performed in violation of this ordinance, which violation might be a menace to life or health, for inspection of such work.

[To be continued]


*SERVICE PLUS!*

ON EVERY COPPER ORDER

● HUSSEY

**HUSSEY SERVICE has become a byword among sheet metal men all over the nation. Quick, on time delivery of any copper necessity has built a reputation for us that we are proud to uphold.**

**Fast service, on even the smallest order, naturally saves money for you because it eliminates delay and tieups due to careless and inefficient handling of orders.**

**Satisfy your customer and yourself by specifying HUSSEY copper on your next job. Our eleven conveniently located sales offices and seven fully stocked warehouses assure you of prompt delivery, and utmost cooperation.**

**Just drop us a penny postcard for a complete list of copper articles carried in stock. If we don't have it, we'll get it for you.**

DISTRICT SALES OFFICES

BALTIMORE, BUFFALO, CHICAGO, CINCINNATI, CLEVELAND, NASHVILLE, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS, SAN FRANCISCO

WAREHOUSES

CHICAGO, CINCINNATI, CLEVELAND, NEW YORK, PHILADELPHIA, PITTSBURGH, ST. LOUIS

**C. G. HUSSEY & COMPANY**

*Division of Copper Range Company*

PITTSBURGH PENNSYLVANIA

# New! SKILSAW DISC SANDERS

TWO POWERFUL MODELS FOR HEAVY DUTY AND CONSTANT PRODUCTION SERVICE

• These two 7 in. SKILSAW Disc Sanders incorporate everything that is new in fine portable tool construction. Their compact streamlined design, power and engineering refinements bring a new standard of performance to this field. Compare every feature and you will choose one of these tools for all sanding and grinding work now done by slow, costly hand methods. *See them at your distributors!*

**Here are the features of SKILSAW DISC SANDERS**

**STREAMLINED BODY** — Smooth, trim design, perfect balance and lighter weight make the tool easier to use. Comfortable grip handles give complete control under heavy sanding loads.

**STRAIGHT-LINE VENTILATION**—Assures a cool-running tool. Ports are located to blow dust away from operator and to prevent clogging. Efficient air-filter protects commutator and motor from abrasive dust and dirt.

**POWERFUL MOTOR**—Ample reserve power to insure long life. Provides for faster sanding and grinding.

**SEALED BEARINGS**—Ball bearings, in all positions, are fully sealed as a protection against dust and grease leakage.

**BEVEL GEARING**—Sturdy and quiet in operation.

**SKILSAW, INC.**
**Dept. E, 3320 Elston Avenue, Chicago**
210 East 40th Street, New York — 52 Brookline Ave., Boston
1429 Spring Garden, Philadelphia
312 Omar Avenue, Los Angeles — 2065 Webster Street, Oakland

## Easy Foot Operation With Niagara GAP SHEARS

1. Easy Operation
2. 16 Gage Capacity — 36" to 72" cutting lengths
3. 18 inch Gap
4. Modern Closed Panel Housings
5. Self Locking Steel Hold-down
6. Visible Cutting Line
7. Steel Cross Head
8. Tubular Treadle Mechanism
9. Niagara Alloy Steel Knives
10. Complete with front, side, bevel, slitting and back gages

Niagara Machine and Tool Works, Buffalo, N. Y.

NIAGARA

*A Complete Line of Machines for Your Sheet Metal Shop*

Folders—Brakes
Groovers—Seamers
Slip Roll Formers
Power Presses

Shears, Squaring, Rotary Lever Shears—Punches
Machines for Turning, Wiring, Beading, Burring, Flanging

# WHITNEY No. 4-B PUNCH

This punch for sheet metal work has a capacity of ¼-in. through 16 gauge. Weight 3 lb. Length 8½-in. Depth of throat 2-in. Complete tool includes three punches and three dies of specified sizes with die adjusting key.

**THE WHITNEY LINE**

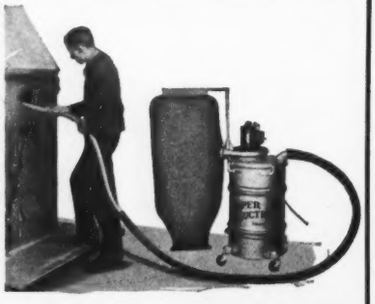
In the W. A. Whitney line of Hand Lever Punches you will find a portable hand lever tool suitable for every requirement. They are made in ten sizes and types, ranging in size from the Tinners No. 4 Punch, which punches ¼-in. hole through 16 gauge iron to the No. 92 Punch, capable of punching a 2-inch hole through ⅛-in. stock. Each tool has its special field of work as recorded in our latest catalog.

**WRITE FOR CATALOG**

W. A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.

# Do You Not Need A Super As Much As You Need A Shop?

**For a man in your business, can you think of any equipment more important than a cleaner for furnaces? Can you name any other thing that makes you so good a profit on its own, and at the same time sells a nice bill of goods, too? Have you a workman who can go out and make your profit on his day's work, and also bring in a lot of orders for parts and repairs and new plants?**



**The Super Furnace Cleaner is doing just that every day for hundreds of heating men. For efficiency, durability and low operating cost, Supers challenge the world. The Super does more — for less cost. Find out about it.**

**A Free Book That Is Worth Money**

**Our Book, worth real money to you, is free. "A Plan which always Increases Profits to Dealers in Heating Plants"—never has failed—tells how to step up volume and profit. A simple way, easily worked, pays big. Write for it.**

USE THIS COUPON

**The National Super Service Company**
**1944 N. 13th Street, Toledo, Ohio**

Send me the Plan Book and complete information about your free trial on the new low-priced Super.

Name .....

Street Address .....

City and State.....


# With The Manufacturers . .

## Sheet Steel Prices

W. W. Sebald, vice president of The American Rolling Mill Company, reports that the new sheet steel prices recently announced for the second quarter of 1937 are still lower than second quarter prices in 1936 although raw materials and labor rates are much higher.

The continuous rolling process, developed by The American Rolling Mill Company, which practically all large sheet producers are licensed to use, has been an important factor not only in offsetting greatly increased raw materials costs and wage rates, but also in improving the quality of sheet metal.

## Gilbert & Barker School

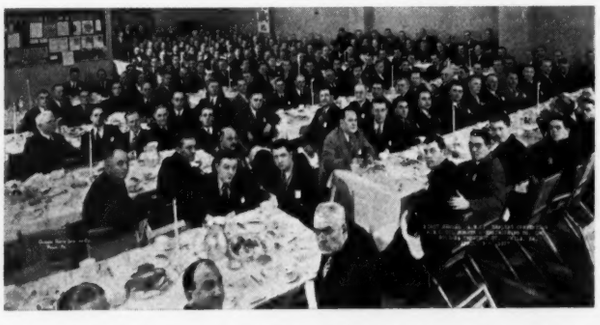
Gilbert & Barker Manufacturing Company, Springfield, Mass., recently completed a three-day school and sales meeting for Gilbarco oil heating and air conditioning dealers.

Warm air conditioning—engineering service and policies, correspondence course, selection of unit, duct systems, registers and grilles, estimating cost, installation, balancing system and service—occupied a part in the program.

## ABC Dealer Annual

ABC Oil Burner & Engineering Company, Inc., 2012 Chestnut Street, Philadelphia, held their annual dealer convention on April 15. About 300 dealers in automatic heating equipment in Eastern Pennsylvania and Southern Jersey attended.

The program started with a turkey dinner, followed by a song fest. J. H. Hirsch gave the history and scope of the organization. Ralph E. Caldwell, merchandising coun-



sellor, told the past, present and probable future of the automatic heating industry. Several ABC dealers gave their experiences.

C. W. Whitney, president announced the new series of schools to be run at the company auditorium for the benefit of all dealers of heating equipment. Starting April 27 and each Tuesday evening the schools will be devoted to warm air heating and air conditioning.

A demonstration sale was given by P. Uzzo, burlesqueing the sale of automatic heating equipment to a stubborn Italian customer.

# Easy Sales— and Profitable!

Sales are easy with the Swartwout Rotary Ventilator because it's a *known* product — with a time-proven record of dependability, efficiency, and economy. Industry has confidence in this ventilator, and your prospects and customers will have confidence in YOU when you fill their requirements with Swartwout Rotaries. Write for catalog and price list.

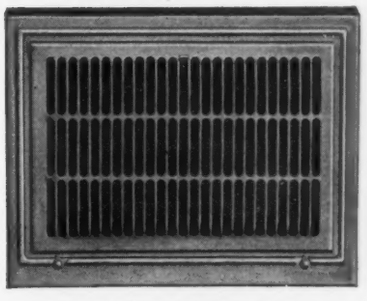
**THE SWARTWOUT CO.**
18615 Euclid Avenue, Cleveland, Ohio

## Swartwout ROTARY BALL BEARING Ventilatiors

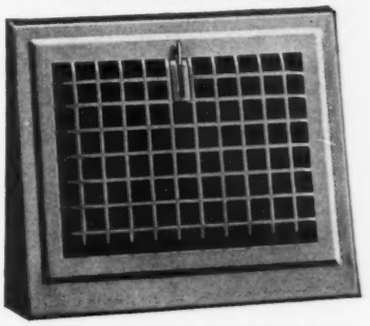
---

# After All, There's no Shortcut to Quality!

**There's no substitute for real craftsmanship. AUER Registers not only present a faultless appearance—they are truly well made in every detail. For strength, for close fitting to wall or floor, for perfect operation—no pains are spared to make AUER Registers above criticism. That kind of scrupulous workmanship takes more time and trouble but it costs you nothing more—and it certainly keeps AUER customers AUER customers. Ask for catalog illustrating complete line of Registers, Cold Air Faces, and Grilles for both warm air heating and air conditioning.**



Elite Two-Piece Register



Aristocrat Baseboard Register

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

## AUER DISTINCTIVE REGISTERS & GRILLES For Air Conditioning *and* Gravity

*FIRELINE gives complete firepot wall—forms 1-piece firebrick lining.*

# FIRELINE

## PROTECTS FIREPOTS !

*. . . insures performance and life of every job.*

FIRELINE every furnace, old or new, and you'll build a following of enthusiastic customers. FIRELINE is the greatest business builder you can command today for it increases the heating capacity of any plant, cuts fuel bills as much as 20%, *eliminates* smoke and soot, ends ash sifting, and protects firepot castings against burning out.

**SAMPLE FREE**

*Write for all the facts, prices, sales helps, and sample.*

FIRELINE is the easiest thing to sell—every home owner wants it once you tell him about it. Start plugging FIRELINE (we furnish sales helps) and you'll keep busy all the year around. It's profitable business too whether repairing cracked or broken firepots or lining new ones. Here's something you should investigate.

**FIRELINE STOVE & FURNACE LINING CO.**

1866-F KINGSBURY STREET, CHICAGO, U. S. A.

## MARSHALLTOWN THROATLESS SHEARS

A Complete Line for cutting in-and-out curves—straight, irregular or circle work. Made in several sizes to cut sheets and plates, any width, up to 1/2 in. thick; also for splitting plates.

No burring, buckling or stretching; clean cuts; a handy machine that is dependable and a time-saver; easily operated and positively accurate.

Write us direct for latest circular matter or ask your jobber about Marshalltown Throatless Shears.

**Marshalltown Manufacturing Co.**

920 E. Nevada Street
Marshalltown, Iowa

# News Items . . . . . .

## Dermon and Malone

J. Dermon Sheet Metal Works, one of the old established Memphis (Tennessee) firms has become Dermon and Malone. P. J. Malone is now associated as a partner.

◆

## Snow Handles Auburn

Tom Snow Heating and Roofing Co., 701 Chestnut St., Chattanooga, Tenn., now has a department devoted to Auburn coal stokers.

◆

## Flavelle Leaves Furblo

James F. Flavelle, 7 N. Third Street, Marshalltown, Iowa, severed his connections, May 1, 1937, with the Furblo Company of Hermansville, Mich., as their representative in the State of Iowa.

◆

## Memphis Firm Uses Radio

Memphis Fence and Roofing Co., 46 West Virginia St., Memphis, Tenn., put on a bright and snappy radio broadcast in December on roofing problems and called attention to steel shingles and roofing needs and advice.

◆

## Haggard Roofing in Kentucky

G. P. Haggard Roofing and Sheet Metal Co., 560 East Third Street, Lexington, Kentucky, is doing a large range of roofing in the Blue Grass section of central Kentucky and in Lexington this spring.

◆

## Memphis Roofers Union

The Roofers union on April 9 claimed that five Memphis concerns had signed union contracts, providing a 60-cent hourly wage for tar and gravel roofers and $1 for tile and terrazo roofers.

◆

## Air Conditioning Systems and Equipment

The value of the orders booked by 98 manufacturers for air conditioning systems and equipment during November, 1936, totalled $3,657,061, for October $4,172,028, and the total for the eleven months ending November 30 was $39,337,544.

◆

## 1936 Stoker Sales

86,080 automatic coal stokers were sold in 1936 by 108 manufacturers reporting sales statistics to the U. S. Bureau of Census, an increase of 79½ per cent over the year 1935, and 200 per cent over 1934, according to the Committee of Ten, 307 North Michigan Avenue, Chicago. From the same source, the committee has compiled data showing mechanical coal stoker sales from 1923 to and including 1936.

**WISS SCROLL-PIVOTER SNIP**

**CUTS RINGS AROUND OTHER SNIPS**

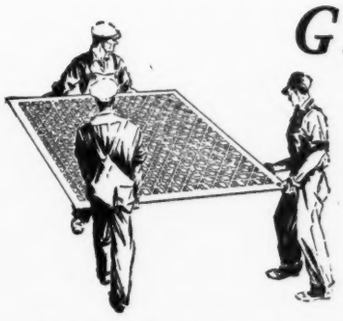
CUTS CIRCLES, SCROLLS AND SQUARES AS EASILY AS A STRAIGHT LINE—WILL CUT ALLOY STEELS

*Use Wiss Hy-Power and Bulldog Snips*

**J. WISS & SONS CO., NEWARK, N. J.**

Established 1848

# CLINTON
PERFORATED METAL
# GRILLES



ARE IN ONE PIECE!

CLINTON GRILLES offer the widest scope of selection. They are made in various gages of steel, brass, bronze, monel and Wissco Bronze. The extensive manufacturing facilities of Wickwire Spencer permit grilles as large as 60″ x 156″ *in one piece.*

WICKWIRE SPENCER STEEL COMPANY
41 East 42nd Street, New York
Buffalo Worcester Chicago San Francisco

*Send for this new GRILLE FOLDER*

**WICKWIRE SPENCER perforated metals**

## WOLFF RED SEAL GALVANIZED SHEETS FOR EVERY NEED

Complete stocks assure the sheet metal worker immediate shipment on all orders placed with this established organization. Wolff super steel service includes special handling, cutting and dispatching facilities.

The Red Seal on Your Sheet Is Your Assurance of Complete Satisfaction

*Over 20 Years of Steel Service*

BENJAMIN WOLFF AND COMPANY
58th St. and Seeley Ave. Chicago Republic 9100

THE WHITNEY METAL TOOL CO.

## NEW!

## WHITNEY-JENSEN

**18 GA.**

**COMBINATION**
PLAIN, BOX and PAN
**BENDING BRAKE**

AVAILABLE IN
5-6-8-10 FT. LENGTHS

WRITE FOR CIRCULAR

91 FORBES ST., ROCKFORD, ILL.

# PREMIER
## FURNACE CLEANERS

**ONE HORSE POWER MODELS $79.50 and $84.00**
**HALF HORSE POWER MODELS $55.00 and $59.50**
COMPLETELY EQUIPPED

Premier Furnace Cleaners are powerful and light weight, yet sturdily built to stand years of rugged service. Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the container for suction and blowing use in cleaning air ducts, registers, grills, radiators and air conditioning equipment.

Motor specifications for these powerful cleaners are:
1 H.P. maximum vacuum 46 inches in water.
½ H.P. maximum vacuum 31 inches in water.

**Business-Getting, Return Post Cards are Available for Dealers at Low Cost**

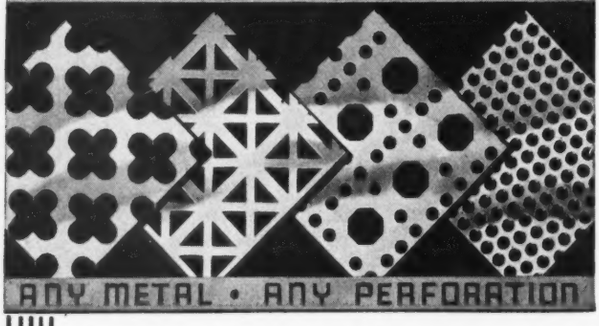
Buy It From Your Local Jobber or Write the Manufacturer

**Furnace Cleaning Instruction Booklet Free with Each Cleaner**

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road · Cleveland, Ohio

PERFORATED METALS

Industrial and Ornamental



ANY METAL • ANY PERFORATION

Industrial Perforations include all sizes of round, oblong, and many special shaped perforations, for Screening, Grading, Draining and Guarding purposes. Our line is very complete.

Ornamental Perforations are used in Architectural Grilles, Radiator Enclosures, Metal Furniture, Cabinets, Stoves, etc. In addition to the standard shapes we have many exclusive and attractive designs suitable for different uses.

H&K workmanship is unsurpassed.

Write for prices and other information.

The Harrington & King PERFORATING CO.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

**How to Sell Furnaces and Repairs**

WITH

**The TORNADO Furnace Cleaner**

The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

The TORNADO is the most powerful furnace cleaner built. Leads the field! Low price — easy payments — free trial. Approved by Anthracite Institute and Underwriters Lab. Thousands in use.

Write now for complete information.

**Breuer Electric Mfg. Co.**

865 Blackhawk Street, Chicago, Ill.

Victor heating equipment is a line that enables you to buy all your requirements from one reliable source.

This Victor demonstrator enables Victor dealers to close sales at a profit. Investigate this money making line. Write or wire.

**HALL-NEAL FURNACE CO., Indianapolis, Ind.**


# —News Briefs—

The Gulf Brewing Co., 5301 Polk St., Houston, Tex., will soon install a warm air and air conditioning system to cost about $35,000.

◆

The Ace Sheet Metal Works has engaged in business at 1502 K Street, San Diego, Cal., under the management of John F. Weekerly.

◆

The Santa Paula Roofing & Sheet Metal Co. has been formed at 119 North 10th Street, Santa Paula, Cal., by Rubert C. and Raymond E. Hilton.

◆

The Southern Equipment Co., 5017 South 38th Street, St. Louis, Mo., has established a sheet metal shop addition to its plant.

◆

Thomas Harrell has engaged in the sheet metal and furnace business at 740 N. E. 21st Street, Portland, Ore.

◆

The Pascoe Tinning Shop, Chadron, Neb., is about to erect a business building on West Second Street.

◆

B. M. Beck has engaged in the sheet metal business at 1023 North Killingsworth, Portland, Ore.

◆

Polar-Air, Inc., has engaged in the manufacture of a line of air conditioning units at 100 North Ewing Avenue, in Dallas, Tex.

◆

The Home Equipment Co. has engaged in the heating and home equipment business at 14 East Alder Street, in Walla Walla, Wash.

◆

Mokler & Maher have engaged in the sheet metal and plumbing business in Kennewick, Wash., in the Hover Block.

◆

The Westwood Sheet Metal Works has engaged in business at 1751 Ensley Avenue, Los Angeles, Cal., under the management of Eugene J. Stachowiak.

◆

Albern B. Jones has engaged in the plumbing, heating and ventilating business at 512 Westminster Avenue, Alhambra, Cal.

◆

John Scholl has sold the Scholl Heating and Implement Co., 201 East Fifth Street, Vancouver, Wash., to H. J. Lyons.

◆

The Carrawat-Byrd Corporation, Dallas, Tex., has moved from 613 North Pearl Street to 401 Elm Street, with its air conditioning business.

◆

The Huwert Heating Corporation has succeeded to the business of Seymour & Huwert, Inc., at 5416 Scotten Avenue, Detroit, Mich.

◆

The W. & M. Sheet Metal Works has been formed at 5811½ N. Figueroa Street, Los Angeles, Cal., by P. J. Cornelius Le Bleu and Alexander Watts.

◆

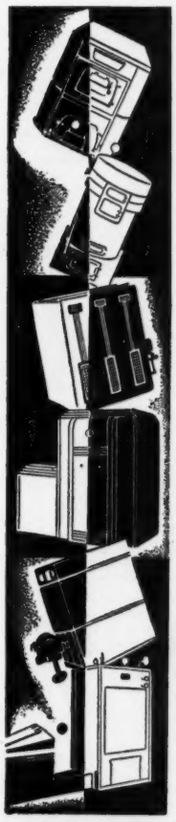
The Dixie Metal & Roofing Co., Inc., has been chartered in Fayetteville, N. C., with capital of $25,000, by E. S. Cook and C. B. Mackethan.

◆

A. W. Pruitt, formerly field secretary of Associated General Contractors, is now in charge of the air conditioning department of the Gay Engineering Corporation of Los Angeles, Cal.

◆

Dixie Metal and Roofing Co., Inc., of Fayetteville, N. C., was chartered in April to deal in metal of all kinds with $25,000 capital. Incorporators: E. S. Cook, C. B. McKeithan, Mrs. Mae W. Cook, Mrs. Lulie McKeithan, all of Fayetteville.



In Every
INSTALLATION
WHEREVER FURNACE CEMENT IS USED

LACLEDE FURNACE CEMENT

Dries Faster
Sets Stronger
Lasts Longer

You may fire the furnace immediately and yet be sure of an air and gas tight joint that stays tight and withstands severe temperatures.

*Free Sample on Request*

LACLEDE-CHRISTY
CLAY PRODUCTS COMPANY
ST. LOUIS • MISSOURI
411 N. SEVENTH ST.

These four sheet metal screws are all that are needed to completely assemble the cabinet on HOME COMFORT'S WINTER AIR CONDITIONERS.
You will agree that it is the quickest and easiest assembly that you have ever seen. The "GRAND PRIZE LINE" is complete. INVESTIGATE!
For details write—
HOME COMFORT FURNACE & MFG. CO.
2901-11 Elliot Avenue, St. Louis, Missouri

HIGH SPEED SHEARING

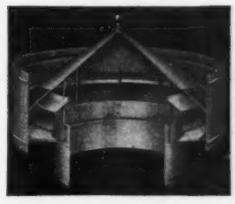
Of Irregular Shapes
—Splitting—
Ring and Circle
Cutting

The ideal shear for sheet metal work — absolutely accurate and easily operated . . . . . metal is sheared and not punched . . . . . cut anywhere, no starting holes required for inside cutting . . . . . only one adjustment for various thicknesses of material used . . . . . material does not feed itself by action of the cutters . . . . . unobstructed cutting vision . . . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . . . long life shear blades. Standard equipment furnished for splitting sheets, ring and circle cutting. Write for complete information.

LIBERT MACHINE CO.
Green Bay, Wisconsin
*Manufacturers of shears since* 1915

Libert Method

BURT STANDARD GRAVITY
VENTILATORS
•
NEWLY
DESIGNED



• This improved Burt roof ventilator gives unusual air moving capacity at a moderate price. It is adapted to most any situation and can be depended on to perform satisfactorily under widely differing conditions. It is storm-proof, strong, rigid and easy to install. Comes in various metals besides standard prime open hearth galvanized steel. Send for descriptive bulletin.

THE BURT MFG. CO.
301 MAIN ST. AKRON, OHIO

# New Literature . . . .

**For your convenience in obtaining copies of new Literature, use the coupon on page 108.**

## 171—Automatic Oil Heating

Electrol Incorporated, 934 Main Avenue, Clifton, N. J., is distributing "Automatic Oil Heating" the Electrical Way, with pictures by Margaret Bourke-White.

## 172—New Discount Sheet

United States Register Co., Battle Creek, Michigan, is distributing a discount sheet effective May 18. Pocket register Manual No. 27 and General Catalog No. 27 are also available.

## 173—Comfortrol Oil-O-Matic

The Waterman-Waterbury Co., Minneapolis, Minn., is distributing a 16-page catalog entitled "Controlled Winter Comfort for the Home, illustrating and describing the Comfortrol Oil-O-Matic air conditioner.

## 174—Revised Heating Manual

Chandler Company, Cedar Rapids, Iowa, is distributing the Chandler Health Master Heating Manual, revised 1937 edition. The purpose of the manual is to help the heating contractor plan and figure Chandler HealthMaster heating systems. The manual is divided into three sections: Heat Loss Calculation, Gravity Warm Air Heating Systems, and Forced Air Heating Systems.

## 175—Wise Warm Air Furnaces

The Wise Furnace Company, Akron, Ohio, is distributing two pieces of literature describing Wise Furnaces.

Specifications for air conditioner with cast iron furnace range from 71,000 to 137,000 Btu at register; with steel furnace, from 76,000 to 156,000 Btu at register; with gas furnace from 70,000 to 360,000 Btu input.

Wise air conditioning units include blowers, air filters, humidifiers, Minneapolis-Honeywell furnacestat and self-lubricating bearings.

## 176—The Thermo-Drip Humidifier

Automatic Humidifier Co., Cedar Falls, Iowa, has issued a bulletin describing the Thermo-Drip Humidifier and its operating characteristics and advantages. Included in the bulletin are useful facts and figures pertaining to humidity requirements in the average warm air heated home. This company also has prepared a new folder which dealers and distributors of the Thermo-Drip Humidifier may use as a selling aid.

## 177—Catalog of Automatic Controls

The Mercoid Corporation, 4201 Belmont Avenue, Chicago, is distributing a new 16-page catalog with plastic binding of their automatic controls with an insert flap on the back cover for a 4-page book of Mercoid automatic control specifications which in turn carries five leaflets describing the various controls.

## 178—Seasonal Selling Plan

Holcomb & Hoke Mfg. Co., Indianapolis, Ind., has prepared for dealers under their 1937 seasonal selling plan, four new envelope stuffers.

The spring mailing will consist of the envelope stuffer "Let H & H F P Buy You Home Comfort With Profit." The summer mailing will carry the envelope stuffer "Buy Your FireTender Now on Our Summer Saving Plan." The early fall mailing will be the "Before Buying Next Winter's Coal" folder, and the winter mailing will feature the "For Men Only" form.


**FAULTESS REPAIR PARTS** *from the original Graff patterns for the following furnaces:*

**FAULTLESS—COMFORT** **FAULTLESS—SCIENTIFIC** **COMFORT** **RIVAL**
**FAULTLESS—LACKAWANNA** **LACKAWANNA** **CAPITAL** **PHILADELPHIA**

*are carried in stock by the following Supply Houses*

PHILADELPHIA, PA.
Aetna Stove Co., Inc.
Central Stove Repair & Fdy. Co.
Standard Stove Repair Co.
M. Stein.
United Stove Repair Co.
Weinstein Supply Co.

WASHINGTON, D. C.
Fries, Beall & Sharp Co.

NEW YORK CITY
G. A. Feld Company

BOSTON, MASS.
Henry N. Clark Co.
Huse & Carleton, Inc.
Waverly Heating Supply Co.
Republic Pipe & Supply Corp.

NEWARK, N. J.
Stove Mfrs. Corpn.

NEW BRUNSWICK, N. J.
New Brunswick Stove Co.

TRENTON, N. J.
Trenton Stove & Repair Co.

NEW HAVEN, CONN.
New Haven Stove Repair Co.

BRIDGEPORT, CONN.
Lipnick Stove Repair Co.

PROVIDENCE, R. I.
E. S. Hallock Co.

SPRINGFIELD, MASS.
The Burden-Bryant Co.

SHAMOKIN, PENNA.
Geo. B. Keiser.

MINNEAPOLIS, MINN.
Dunham-Scott Co.

MILWAUKEE, WIS.
Milwaukee Stove & Fce. Repair Co.
The Speich Co.

CHICAGO, ILL.
Associated Heater Parts Co.
M. Brucker.

SEATTLE, WASH.
Colcock Furnace Company

DETROIT, MICH.
Detroit Stove & Fce. Repair Co.
Star Steel Supply Co.

FORT WAYNE, IND.
Wayne Pattern & Fdy. Co.

BUFFALO, N. Y.
O. G. & D. H. Donaldson.
Minet Heating Supply Co.

JAMAICA, N. Y.
Jamaica Stove Supply Co.

BINGHAMTON, N. Y.
Daniel G. Carver

PITTSBURGH, PENNA.
The Graff Co.
A. H. Johnson Co.
Shamblen Furnace Parts Co.

ROCHESTER, N. Y.
Henry Siebert Sons, Inc.

SYRACUSE, N. Y.
Stove & Furnace Repair House

ELMIRA, N. Y.
C. Arthur Miller & Son.

SCRANTON, PENNA.
Samuel Weinberg & Sons, Inc.

WILKES-BARRE, PENNA.
White Hardware Co.

ALLENTOWN, PENNA.
Pennsylvania Supply & Mfg. Co.

**FAULTLESS HEATER CORP'N** MANUFACTURERS Successor to THE GRAFF FURNACE COMPANY **Cleveland, Ohio**



**PORTABLE SHEARS**
**ALL-ALLOY**

ALL-ALLOY No. 2 cuts up to ¼" steel plate.
ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.
Special blades may be had for shearing stainless steel.

**FULLY GUARANTEED**

**BREMIL MFG. CO. Erie, Pa.**

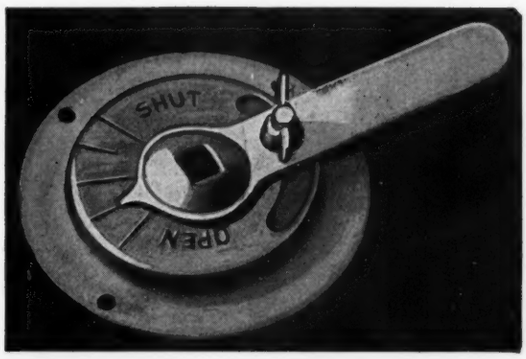
**SCHAEFER FURNACE and FLUE BRUSHES**

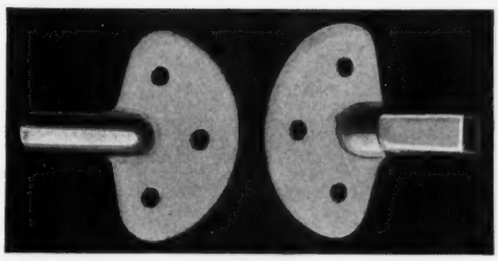
Now is the time to stock Schaefer Brushes. Built for hard service in sizes to meet any requirement. "Buy SCHAEFER—It's Safer."

**Schaefer Brush Mfg. Co.** 217 W. Walker St. Milwaukee, Wis.

## Apex Damper Regulator

*LOCK-TITE*



⅜" F. Regulator and ⅜" No. 3 Damper Bearings.

Order by Set No. 31-3. Complete with Screws and Rivets. Order from your jobber.

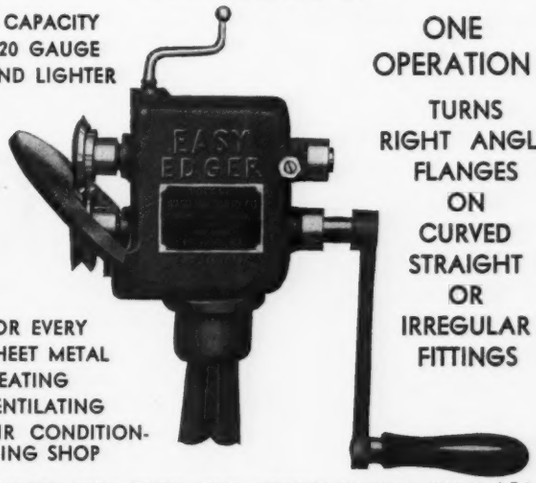
OHIO PRODUCTS COMPANY
17606 Milburn Ave., Cleveland, O.

## AT LAST!

THE EASY EDGER—A FLANGING MACHINE THAT FLANGES IN—

CAPACITY 20 GAUGE AND LIGHTER

ONE OPERATION




TURNS RIGHT ANGLE FLANGES ON CURVED STRAIGHT OR IRREGULAR FITTINGS

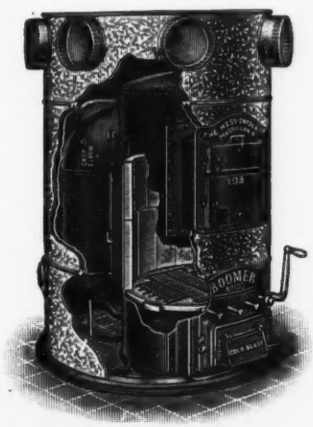
FOR EVERY SHEET METAL HEATING VENTILATING AIR CONDITIONING SHOP

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY ($\frac{7}{32}$)

| MORE SIMPLE THAN A BURRING MACHINE | NO GAUGES TO ADJUST | SPEEDY ACCURATE UNIFORM EDGES |
|---|---|---|

WRITE FOR DETAILS

WARD MACHINERY COMPANY
564 W. WASHINGTON BLVD.
CHICAGO ILLINOIS




## Boomer Boiler Plate Furnaces

*Also made with duplex grates and upright shaker.*

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are interested in selling a strictly high grade furnace, ask for prices and agency.

Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original patterns. Prices are low.

***We sell to legitimate dealers only.***

THE HESS-SNYDER CO., MFRS.
Massillon, Ohio

## Nu DRY

### IS THE AIR CONDITIONING FURNACE CEMENT

On all air conditioning jobs assure yourself of service free profit by the use of Nu Dry, the air conditioning furnace cement.

Permanent, air tight joints.

Does not crack or powder when furnace is fired immediately after it is applied.

Will not shrink.

Takes less material to set a furnace.

It comes to you in dry form.

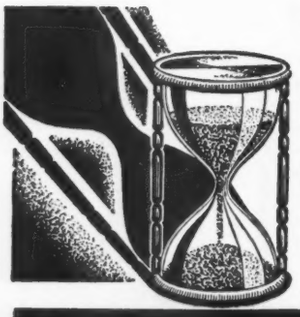
PYROLITE PRODUCTS CO.
1221-31 W. 74th St., Cleveland, Ohio

Name .....

Address .....

Jobber's Name .....

Jobber's Address .....



**IT SAVES YOU TIME**

**The uniform, close grain of Lyonore Metal retards corrosion, means greater tensile strength and easier workability. It may be formed into intricate shapes without flaking. Saves labor costs on any job. Ask for complete details.**

LYON, CONKLIN & COMPANY, Inc.
Baltimore, Maryland

**Lyonore Metal**

CHROMIUM • NICKEL • COPPER • IRON ALLOY

**ACME "Hot Spot" WELDERS**

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

*Write for literature and prices*

**Don't Rivet**
**SPOTWELD!**
**with an ACME**
Lifetime Guarantee!

*Complete range of sizes*

**ACME ELECTRIC WELDER CO.**
Warehouses in principal cities
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# New Literature . . . . .

**For your convenience in obtaining copies of new Literature, use the coupon on page 108.**

## 179—Dutch Boy Painter Magazine

National Lead Company, 111 Broadway, New York City, has published No. 5 of Vol. 29 of Dutch Boy Painter Magazine.

◆

## 180—Welder Specification Bulletin

The Lincoln Electric Company, Cleveland, is distributing Welder Specification Bulletin No. 318—"Shield-Arc SAE" welder.

◆

## 181—The Enduro Era

Republic Steel Corporation, Alloy Steel Division, Massillon, Ohio, is distributing No. 12 of Vol. 5, "The Enduro Era."

◆

## 182—Inco—No. 3 of Vol. XIV

The International Nickel Company, Inc., 67 Wall St., New York City, is distributing No. 3 of Vol. XIV of INCO, published quarterly and devoted to the uses of nickel and nickel allows.

◆

## 183—Mechanics' Snips and Shears

Bartlett Manufacturing Company, 3003 East Grand Blvd., Detroit, Michigan, is distributing a 6-page envelope stuffer with space for dealer imprint, picturing and describing the various mechanics' snips and bench shears manufactured, with price list.

◆

## 184—Drawing Equipment

Wade Instrument Company, 2274 Brooklyn Station, Cleveland, Ohio, is distributing a folder showing a new sketch pad set of tracing paper with a guide sheet with Isometric pattern on one side and ⅛ in. squares on the other; a new adjustable irregular curve; and other drawing instruments, blue print papers in sheets and tracing papers.

◆

## 185—Shippers' Guide

Consolidated Guide Corporation, 153 N. Michigan Avenue, Chicago, has published the Co-Ordinated Rate Guide for shippers. A thumb-index reference leads the user instantly to the comparative rail, truck, express and parcel post shipping rates from 109 key points throughout the country to thousands of destinations. Air, water and foreign parcel post rates form important sections of the Guide.

◆

## 186—Handy Reference Booklet

Niagara Machine and Tool Works, 637 Northland Ave., Buffalo, N. Y., is distributing a 3¼ x 5⅜ "Niagara Handy Reference Booklet," for sheet metal work with illustrations, brief description and specifications of their various machines—a table of gauges of sheet iron, a table of circles —their circumferences and areas, and formulas for estimating weight of metal for rectangular and round duct work.

◆

## 187—Welding Specification Bulletins

The Lincoln Electric Company, 12818 Coit Road, Cleveland, Ohio, is distributing the following four-page folders:

Welder Specification Bulletin No. 314, covering their Lincoln SA 150 portable unit welder.

Welder Specification Bulletin No. 316, covering their Lincoln "Shield-Arc SAE" welder, a portable unit.

Welder Specification Bulletin No. 317, covering their "Shield-Arc SAE" welder belted or direct-driven models 200, 300, 400, 600 amperes.

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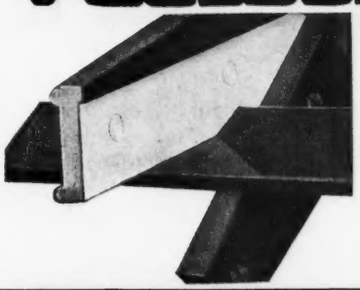
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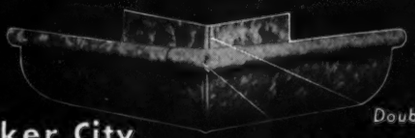
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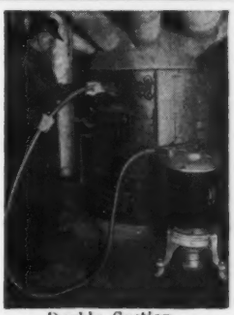
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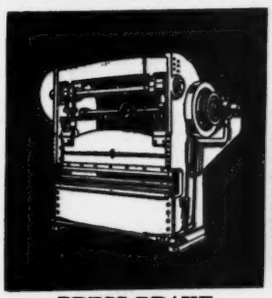
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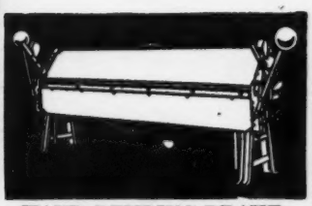
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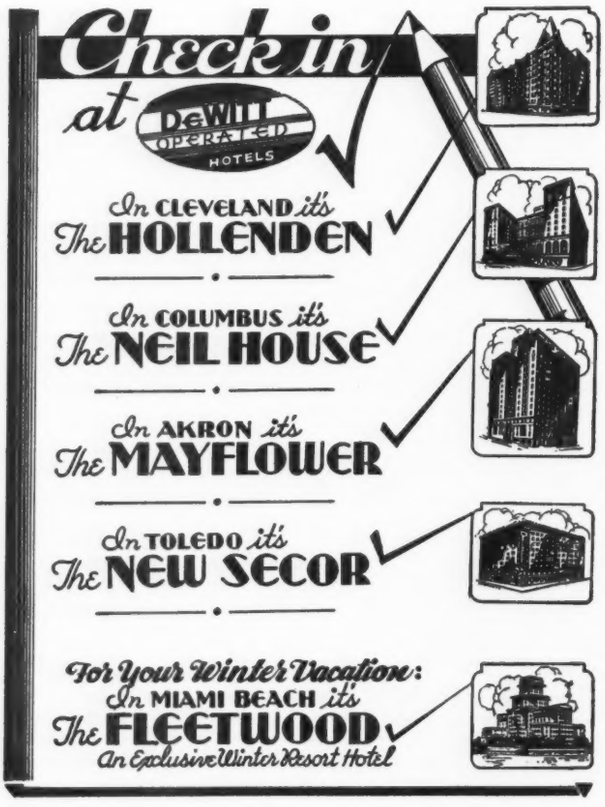

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# New Literature . . . .

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## 188—Underwriting Counsel

A. O. Corbin & Company, 135 Broadway, New York City, are underwriting counsellors—acting as advisors only to corporations about to engage in financing transactions; to originating investment houses; to holders who seek to distribute large blocks of stock through investment firms; and to accountants, attorneys, banks and others who act as advisors to issuers, vendors and underwriters of securities.

The story of their service is in booklet form.

◆

## 189—Stokolair-Humidifier

Schwitzer-Cummins Company, Blower Division, Fan Street, Indianapolis, Ind., is distributing an installation manual for the Stokolair Humidifier, as well as a 4-page descriptive circular describing the same product.

The Stokolair-Humidifier is designed to conform with the modern trend for better living in smaller and moderate sized homes, supplying heated air that is clean, circulated and with the humidity regulated just to the owner's liking.

A humidistat and a windowstat automatically control the device.

◆

## 190—The Path to Sheet Metal Permanence

Republic Steel Corporation, Cleveland, Ohio, is distributing one of the most modern of the current pieces of industrial literature dealing with steel metal.

Entitled, "The Path to Sheet Metal Permanence," this 20-page booklet contains more than 60 interesting photographs depicting many uses for sheet metal in a wide variety of applications. Information or rust resistance, forming and welding properties, as well as data on physical properties and constants, forms, finishes, sizes and gauges are presented in an attractive manner.

◆

## 191—Burning High Volatile Bituminous Coal

Appalachian Coals, Inc., Transportation Building, Cincinnati, Ohio.—"Leave holes in fire-door open" is the instruction given in the "Which End?" booklet. Since some readers question the advisability of this practice, the Fuel Engineering Division of ACI has issued the following explanation:

"These instructions apply to high volatile bituminous coal, and the reason this practice is recommended is to improve the combustion of volatile matter rising from the fuel bed, and to prevent smoke. Over-fire air is particularly desirable immediately after placing furnace charge of coal in the fire bed, for the reason that not enough air will pass throught the fuel bed to totally burn the gas liberating almost immediately after firing."

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FOR SALE: A long established sheet metal and roofing business in a Wisconsin city of 19,000 population, Paper Mill territory. Well equipped up-to-date shop and office. Address Key No. 403, American Artisan, 6 No. Michigan Ave., Chicago, Ill.

FOR SALE: 62" Pexto Square Shear, foot power, and 72" Chicago Brake. Excellent condition. Trade for eight or ten foot equipment. Vorys Brothers, Inc., Columbus, Ohio.

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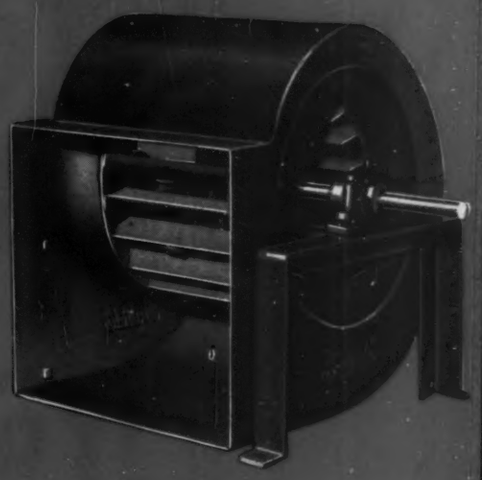

When you install a job that isn't satisfactory—you get the blame regardless of whose equipment you have used on the job. Then why take a chance on so vital a thing as the fan when you can be sure by installing "Buffalo H. V. A. Fans" on all those warm air heating jobs.

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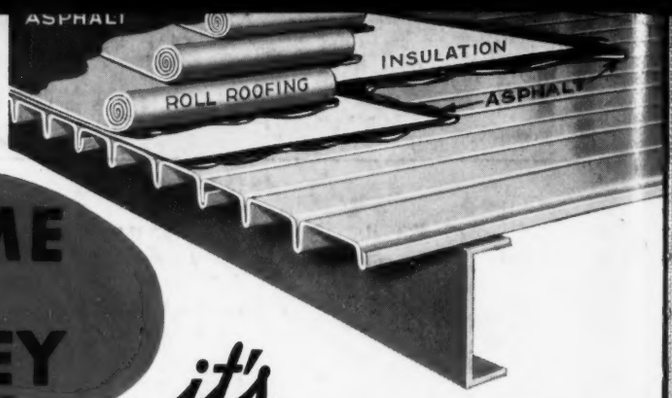


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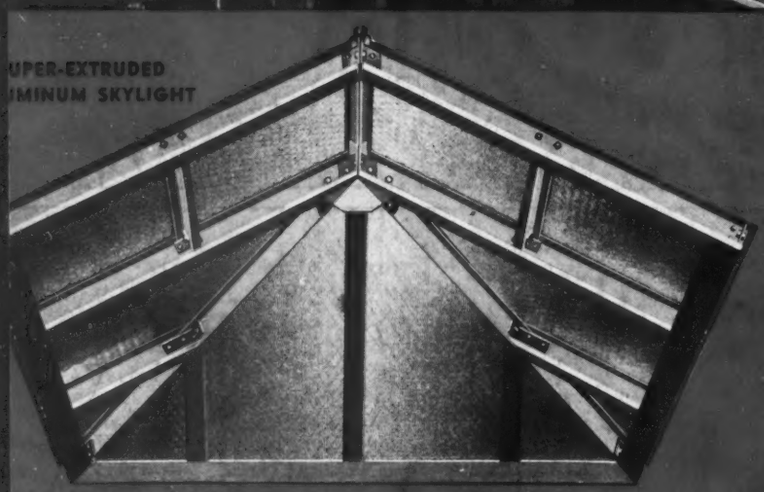
# MILCOR

## FOR EVERY JOB

**You'll find that your roofing jobs will speed up with Milcor Steel Roof Deck. A fast-running, easy-to-handle job not only means more profit on every contract, but also builds extra good will by bettering promised completion dates. Milcor Roof Deck is unusually strong, capable of carrying heavy loads. It is light in weight, with a unique offset that enables you to nest the sections speedily. Insulating materials can be applied on the flat, unbroken surface with a minimum effort, and roll roofing laid with ease. Write for the Milcor Roof Deck bulletin — giving information on this practical product.**

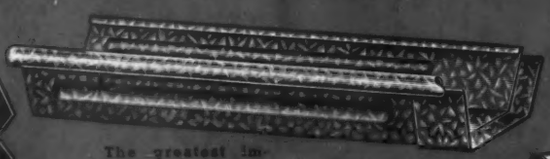


"NU-ALPINA" VENTILATOR

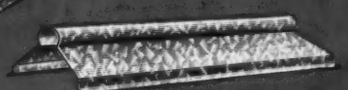
"KONICAL" VENTILATOR

"NU-AIR" VENTILATOR

MILCOR CONDUCTOR PIPE & EAVES TROUGH
All styles and sizes




The greatest improvement in rain-carrying equipment in forty years. (Patent Applied For)


MILCOR RIDGE ROLL

MILCOR ORNAMENTAL HIP TILE

## MILCOR STEEL COMPANY

MILWAUKEE, WISCONSIN — CANTON, OHIO

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